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WHY DOES MAN EXIST?

THE CONTINUATION AND CONCLUSION OF

Whence Comes Man?

BY

ARTHUR JOHN BELL

"Try all things, hold fast that which is good"

LONDON
WM. ISBISTER LIMITED
15 & 16, TAVISTOCK STREET, COVENT GARDEN, W.C.
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"SUPPOSING these answers to be accepted, other questions suggest themselves. We want to know why man exists. We want to know why God 'created' him. Did God desire that man should be good? Is there any reason why he *should* be good? If there be, then why does evil exist? And there arises also the further question—that, supposing there be a good reason why man *should* be good, is goodness 'possible' to him? If his 'character' be made *for* him, not *by* him, how *can* he be good, if his character, which he did not make himself, be not good? Does his existence terminate at death? Does he come into the world only for the sake of what he therein does—suffers—enjoys? or is his existence continued after death? Is that existence, if it *be* 'continued after death,' to be desired or to be dreaded? Is the having been born a misfortune or a blessing? What is the character of God? Is He a Being to be feared—to be hated—or to be loved? What are man's relations to his fellow-man? What are man's relations to God—that awful Being whose power over us seems to be absolute? and that last, most terrible of questions, Is man's existence owing to God's malevolence—to His indifference—or to His Love?"—"*Whence comes Man?*" (last page).

NOTE.—Unless otherwise specified, all words in italics have been italicised by the present writer.

All parentheses inserted by the present writer in any quotation are indicated by their being enclosed in square brackets [ ].

WHY DOES MAN EXIST?

CHAPTER I.

THE NATURE OF MAN AND THE CONDITIONS OF LIFE.

THE nature and constitution of man is such that he desires some things and dislikes others. Those things which he desires are such as produce or cause in him pleasure or happiness or satisfaction; those things which he dislikes produce or cause in him pain or misery. He is consequently inclined to seek the one and to avoid the other. To bring about the state of pleasure or happiness, and to avoid, or, if present, to change, the state of pain or misery to the state of pleasure or happiness or satisfaction, may be said to be the cause, direct or indirect, of all conscious action, whether in the amœba or in man.

Having been compelled to believe that nature and man were created by an Infinite Being, we are also compelled to believe that nature and man are what they are and as they are, and that each and every atom and each and every life bear to one another the relations we know them to bear, because such was His will. It is conceivable that they might have been otherwise. The powers constituting nature and life might have been more, or fewer, or different —that is, so far as a human creature is able to think of the acts of God. Although our thoughts of the acts of God—or even whether God "acts" at all in the way *we* think of as acting—cannot by any possibility include

the whole truth, it seems to me that they must contain *some* truth, must be to some extent correct: for we have seen that the Infinite-Absolute-God has so created us that "relations" between Himself and us are possible; not only possible, but the absence of such relations is *im*possible. We are justified in believing that, whatever other inconceivable, unimaginable powers are present in God, God must be capable of consciousness as *we* are capable of consciousness.

We cannot help thinking that God has what we would call a *reason* for doing what He has done, that He has created nature and man for some *purpose*. In our thoughts about God we have no other data than those furnished by analogies drawn from the highest creature He has created —that is, so far as we know—man.

When we ask, "Why does man exist?" we mean, What was God's *reason* for causing man to exist?

We have seen that man acts. He seems to have only one cause of action—Desire. That single word seems, either directly or by implication, to cover the whole sum of causes of human action. We "*desire*" to have pleasure; we "*desire*" to avoid pain; or, if pain is present, we "*desire*" to banish it and to have pleasure instead of it.

That which produces pleasure, or that which tends to produce pleasure, man calls "*good*"; that which produces pain, or *tends* to produce pain, he calls evil.

Man was created by an Infinite Being. That Being so constituted him that his one desire is pleasure or happiness. If man was *always* happy, his judgment of the character or nature of the Being who created him would be that He was a *good* Being; for in the whole world there would be nothing but happiness.

How far does the past, the present, and the probable future state of the world justify such a judgment?

Man is the highest of living beings. He is the latest result of a process of evolution, commencing with a minute

mass of nucleated protoplasm which develops in two different directions. The one results in the vegetable, the other in the animal world. There is no perceivable difference in the mode of origin of the two; but by degrees they separate, never again to be united.

The condition of evolution is "variation" and "heredity." The offspring of a creature is not always exactly like its parents: it is, in many cases, more or less different. Creatures, whether plants or animals, tend to increase in numbers more rapidly than the food on which they live tends to increase. There is consequently a continual struggle for possession of the means of existence: in that struggle the strongest and luckiest necessarily survive. When the "variation" or unlikeness of any of the progeny to their parents is of a character advantageous in any way to its possessor in the struggle for life, that particular individual will have a better chance of survival than those which do not possess such advantage; for the latter will get an insufficient quantity of food to sustain them, or even be starved altogether. As living creatures by heredity transmit to their descendants their strengths and their weaknesses, the posterities of the stronger will tend to grow stronger and stronger, while those of the weaker will tend to grow weaker and weaker. The stronger, in course of time, may gradually extinguish the weaker, and form what naturalists call new species. By continual repetitions of this evolutionary process the primordial speck of nucleated protoplasm has developed through advantageous variations—the struggle for existence, and the necessary survival of the fittest, the strongest, and the luckiest—to its highest form, that of man.

Thus man has arisen, has been evolved, developed: but at what a cost!

In relation to animals the principle of evolution is a principle to be expressed in few words—universal selfishness, universal carnage. The murderous law of animal life

is, Kill or be killed, or Kill for awhile for your own benefit, then you will yourself be killed by something stronger than yourself. If you *should* chance to escape all foes and die of natural decay, you will probably suffer a concentration of the horrors of disease, of hunger and of thirst. Your life will, with the exception of a few brief intervals of satisfied desires, have been one long agony of fear. If you happen to be one of the lowest of the low—an amœba, for instance —your consciousness will be so feeble, so dim, that you will suffer but little; but if your sufferings are small, so will be your enjoyments. The higher you rise in the scale of being, the more pitiable will be your lot. "Highness" means increased sensibility, increased desires. Every new capability of "desiring" means an increased possibility of enjoyment, and therefore to be desired; and so it would be if the means of gratification increased at an equal rate with the increase of the desires. But it is not so—nay, would seem to be exactly the contrary. The history of animal life seems to be one long history of continually increasing pain.

Is God, then, cruel—malevolent?

Man, being the highest of all animals, has the greatest number and variety of desires, consequently the greatest capacity—through the gratification of those desires—for pleasure; the greatest capacity—through the non-gratification of those desires—for pain. Was it "good" of God to give the desires without providing for their gratification? Was it because He was *unable* to provide for such gratification? Supposing such inability to exist, was it wise or benevolent to create the desires? So far as we have been able to judge, God not only created man, by the process of evolution, *but He also created all the circumstances*, all the conditions, in the midst of which he was to live. Could not the man and the circumstances, by some differences in one or both, have been so adapted to each other that the result should have been happiness? We are sometimes

happy. The state is possible to us. Love, the highest of all human happinesses, is sometimes successful, sometimes almost perfect, and the human creature gets a glimpse of the possibilities open to him; but, on the other hand, Shakespeare says:—

> "Ah me! for aught that ever I could read,
> Could ever hear by tale or history,
> The course of true love never did run smooth;
> But, either it was different in blood,
> Or else misgraffed in respect of years,
> Or else it stood upon the choice of friends;
> Or, if there were a sympathy in choice,
> War, death, or sickness did lay siege to it;
> Making it momentary as a sound,
> Swift as a shadow, short as any dream,
> Brief as the lightning in the collied night,
> That, in a spleen, unfolds both heaven and earth,
> And ere a man hath power to say—Behold!
> The jaws of darkness do devour it up:
> So quick bright things come to confusion."

CHAPTER II.

THE CRUELTY OF NATURE IN RELATION TO MAN.

In his "Three Essays on Religion," Mr. J. S. Mill, speaking of nature in relation to man, says (page 28):—

"In sober truth, nearly all the things for which men are hanged or imprisoned for doing to one another are 'Nature's' every-day performances. Killing, the most criminal act recognised by human laws, Nature does once to every being that lives; and in a large proportion of cases after protracted tortures, such as only the greatest monsters whom we read of ever purposely inflicted on their fellow-creatures.

"Nature impales men, breaks them as if on the wheel, casts them to be devoured by wild beasts, burns them to death, crushes them with stones like the first Christian martyrs, starves them with hunger, freezes them with cold, poisons them by the slow or quick venom of her exhalations. All this Nature does with the most supercilious disregard both of mercy and of justice, emptying her shafts upon the best and noblest indifferently with the meanest and worst; upon those who are engaged in the highest and worthiest enterprises, and often as the direct consequences of the noblest acts, and it might almost be imagined as a punishment for them. She mows down those on whose existence hangs the well-being of a whole people—perhaps the prospects of the human race for generations to come—with as little compunction as those whose death is a relief

to themselves, or a blessing to those under their noxious influence. Such are Nature's dealings with life. Even when she does not intend to kill, she inflicts the same tortures in apparent wantonness. In the clumsy provision which she has made for that perpetual renewal of animal life, rendered necessary by the prompt termination she puts to it in every individual instance, no human being ever comes into the world but another human being is literally stretched on the rack for hours or days, not unfrequently issuing in death. Next to taking life—equal to it according to a high authority—is taking the means whereby we live; and Nature does this too on the largest scale and with the most callous indifference. A single hurricane destroys the hope of a season; a flight of locusts, or an inundation, desolates a district; the waves of the sea, like banditti, seize and appropriate the wealth of the rich and the little all of the poor. Everything, in short, which the worst men commit, either against life or property, is perpetrated on a larger scale by natural agents. Nature has noyades more fatal than those of Carrier; her explosions of fire-damp are as destructive as human artillery; her plague and cholera far surpass the poison cups of the Borgias; anarchy and the Reign of Terror are overmatched in injustice, ruin, and death by a hurricane and a pestilence." And "nature" was created by, is the work of God.

"But it is said all these things are for wise and good ends.

"That much-applauded class of authors, the writers on natural theology, . . . have exhausted the resources of sophistry to make it appear that all the suffering in the world exists to prevent greater,—that misery exists, for fear there should be misery,—a thesis which, if ever so well maintained, could only avail to explain and justify the works of limited beings compelled to labour under conditions independent of their own will, *but can have no application to a Creator assumed to be omnipotent; who, if he bends to a supposed necessity*

himself makes the necessity which he bends to. If the maker of the world 'can' all that he 'will,' he wills misery, and there is no escape from the conclusion. . . . If the Creator of mankind willed that they should all be virtuous, his designs are as completely baffled as if he had willed that they should all be happy: and the order of nature is constructed with even less regard to the requirements of justice than to those of benevolence. If the law of all creation were justice and the Creator omnipotent, then in whatever amount suffering and happiness might be dispensed to the world each person's share of them would be exactly proportioned to that person's good or evil deeds: no human being would have a worse lot than another, without worse deserts; accident or favouritism would have no part in such a world, but every human life would be the playing out of a drama constructed like a perfect moral tale."

Referring to the causes of human actions and their relation to the Creator, Mr. Mill writes (page 43):—

". . . *That when he implanted positive stimuli in the creatures themselves, stirring them up to a particular kind of action, it is impossible to doubt that he intended that sort of action should be practised by them.* This reasoning, followed out consistently, would lead to the conclusion *that the Deity intended, and approves, whatever human beings do*; since all they do, being the consequence of some impulses with which their Creator must have endowed them, *all must equally be considered as done in obedience to his will.*"

Page 55.—"Those who argue, from particular indications, that providence intends this or that, either believe that the Creator can do all that he will, or that he cannot. If the first supposition is adopted—if providence is omnipotent, providence 'intends' *whatever happens*, and the fact of its happening proves that providence intended it—*if so, everything which a human being can do is*

predestined by providence, and is a fulfilment of its designs."

Page 112.—". . . It is impossible that any one who habitually thinks, and who is unable to blunt his inquiring intellect by sophistry, should be able without misgiving to go on ascribing absolute perfection to the author and ruler of so clumsily made and capriciously governed a creation as this planet and the life of its inhabitants. The adoration of such a being cannot be with the whole heart, unless the heart is first considerably sophisticated. The worship must either be greatly overclouded by doubt, and occasionally quite darkened by it, or the moral sentiments must sink to the low level of the ordinances of nature ; the worshipper must learn to think *blind partiality, atrocious cruelty, and reckless injustice not blemishes in an object of worship, since all these abound to excess in the commonest phenomena of nature.*"

In this awful indictment there seems to be no flaw. If, as I have endeavoured to show, both "nature" and "man" owe their existence to God, and are as they are because He so made, so constituted them, how could they possibly—even to the smallest extent—act otherwise than they do? And the inference to be drawn would seem to be that the Creator must be a malevolent being. It has been conjectured by some that it is possible God did the best that could be done with the materials out of which He constructed nature and man, and that the imperfections were not the result of a malicious intention to produce pain and misery. Mr. Mill thinks that a careful study of "design," as expressed in nature by the wonderful manner in which some arrangements of things are adapted to particular and beneficial ends, indicates some consideration for the well-being of the living creatures He has created. But for us, who have been compelled to believe that God *created* all that which He "arranged," no such palliation is possible. We are compelled to consider all the results of the various

actions of nature and of life to have been intended—purposed. The only thing which can be urged in extenuation seems to be that the Creator did not act quite so maliciously as He might have done, for He might so have created and arranged things that life might have been even more miserable than it is.

CHAPTER III.

IS GOD, THEN, MALEVOLENT?—PESSIMISM: SCHOPENHAUER.

MR. MILL'S picture of life is sufficiently gloomy; but Pessimism paints it in still darker colours. Perhaps the most pessimistic of pessimists is Schopenhauer. In his work "The World as Will and Idea," page 402, he writes:—

"We saw that *the inner being of unconscious nature is a constant striving without an end and without rest.* And this appears to us much more distinctly when we consider the nature of brutes and man. *Willing and striving is its whole being;* which may be very well compared to an unquenchable thirst. *But the basis of all willing is need, deficiency, and thus pain; consequently the nature of brutes and man is subject to pain, originally and through its very being.* If, on the other hand, it *lacks* objects of desire because it is at once deprived of them by a too easy satisfaction, a terrible void and ennui comes over it—*i.e.*, its being and existence *itself* becomes an unbearable burden to it. Thus its life swings like a pendulum backwards and forwards between pain and ennui. This has also had to express itself very oddly in this way: after man had transferred all torments to hell, there then remained nothing over for heaven but ennui."

Page 411.—"All satisfaction, or what is commonly called happiness, is always really and essentially only *negative* [Schopenhauer's italics], and never positive. It is not an original gratification coming to us of *itself*, but must

always be the satisfaction of a wish. The wish—*i.e.*, some *want*—is the condition which precedes every pleasure. But with the satisfaction, the wish, and therefore the pleasure, cease. *Thus the satisfaction or the pleasing can never be more than the deliverance from a pain, from a want.*"

Page 415.—"The life of every individual is . . . always a tragedy. The never-satisfied wishes, the frustrated efforts, the hopes unmercifully crushed by fate, the unfortunate errors of the whole life, with the increasing suffering and death at the end, are always a tragedy."

Page 418.—"Every biography is the history of suffering, for every life is, as a rule, a continual series of great and small misfortunes. According to this, the brevity of life, which is so constantly lamented, may be the best quality it possesses. If we should bring clearly to a man's sight the terrible sufferings and miseries to which his life is exposed, he would be seized with horror; and if we were to conduct the confirmed 'optimist' through the hospitals, infirmaries, and surgical operating-rooms, through the prisons, torture-chambers, and slave-kennels, over battle-fields and places of execution,—if we were to open to him all the dark abodes of misery, where it hides from the glance of cold curiosity, and, finally, allow him to glance into the starving dungeon of Ugolino—he, too, would understand at last the nature of this best of possible worlds. For whence did Dante take the materials for his hell but from this actual world? And yet he made a very proper hell of it. And when, on the other hand, he came to the task of describing heaven and its delights, he had an insurmountable difficulty before him, for our world affords no materials at all for this."

Page 403.—"Man . . . is the most necessitous of beings: he is through and through concrete willing and needing; he is a concretion of a thousand necessities. With these he stands upon the earth left to himself, uncertain about everything except his own need and misery. Consequently the

care for the maintenance of that existence under exacting demands—which are renewed every day—occupies, as a rule, the whole of human life. At the same time he is threatened from all sides by the most different kinds of dangers, from which it requires constant watchfulness to escape. With cautious steps and casting anxious glances round him, he pursues his path, for a thousand accidents and a thousand enemies lie in wait for him. Thus he went while yet a savage, thus he goes in civilised life; there is no security for him.

"The life of the great majority is only a constant struggle for this existence itself, with the certainty of losing it at last. But what enables them to endure this wearisome battle is not so much the love of life as the fear of death, which yet stands in the background as inevitable, and may come upon them at any moment. Life itself is a sea full of rocks and whirlpools, which man avoids with the greatest care and solicitude, although he knows that, even if he succeeds in getting through with all his efforts and skill, he yet by doing so comes nearer and nearer at every step to the greatest, the most inevitable and irremediable shipwreck—death. This is the final goal of the laborious voyage, and worse for him than all the rocks from which he has escaped."

Page 404.—"Thus, between desiring and attaining all human life flows on throughout. *The wish is in its nature pain;* the *attainment soon begets satiety;* the end was only apparent; the wish, the need, presents itself under a new form; when it does not, *then follows desolateness, emptiness, ennui,* against which the conflict is just as painful as against want."

Thus the essence of the pessimistic idea is that—

Evil is of the very essence of existence.
Life is necessarily and hopelessly wretched.
To live is to desire.
To desire is to want.
To want is to suffer.

Wretchedness always outweighs felicity.

Nothing is worth the trouble it costs us.

To the "Pantheist" who believes that God is all, and that all is God, the views just set forth imply simply a universal misfortune, arising out of the nature of the Pan-Theos, which cannot help acting as it does. To the "Panist," who does not believe in any God whatsoever; who believes that the matter and force of the universe have eternally existed; the past history and present state of things could not possibly be otherwise than what they have been, are, and will be. But to the Theist—to the believer in an Infinite Creator, to the believer in God—no such solution of the problem of life is open. Unless it can be shown that pessimism is inconsistent with a right reading and a right interpretation of the phenomena of existence, the consideration of the universal misery of life leads to a state of blank despair, and a frightful feeling of resentment against its cause. If we are to accept the doctrine that life and misery are synonymous terms; that the essential nature of the sum of existence is such as to shut out all hope that the universal pain, which seems to be the necessary concomitant of all consciousness, can ever, even in the smallest degree, be alleviated; but that, on the contrary, the higher is the development the higher is the suffering, what is left but despair? what is left to us but to "curse God and die"?

Die! yes; but as a means of escape even that miserable refuge is denied us. We *cannot* "die," we are "incapable" of death, in any real sense of the word. If by death is meant annihilation, a real "ceasing to be," death is impossible. Gravity does not die. Cohesity does not die, "*Powers*" *cannot die.* Life is a Power, and in common with all other Powers it is, cannot but be, immortal. Theologists and Philosophers seek for proof of the immortality of the soul. Most people in their heart of hearts believe that no such proof is possible, but the very contrary is the fact. It is proofs of *mortality*, of annihilation, which cannot be found.

The nature of Powers is to be incapable of death. We believe them to have been created; we must also believe that the same Being who caused them to be can also—if it so please Him—cause them to cease to be; but otherwise they must be immortal. No experience has given us an example of anything having been deprived of its gravity, its chemic attractions and repulsions, its cohesity, its polarity, its elasticity. Man is a Power *above* all these, and dominates them; but he can exist in this world only under certain conditions of relation to certain combinations of those other Powers which he dominates: when these conditions are not fulfilled he leaves that aggregate he calls his body; he is said to "die"; but to suppose that such vacation, such "death," implies *annihilation*—ceasing to be—is as likely as that gravity can cease to be. If God be a malevolent Being, death presents no means of escaping from Him.

When some tender human heart, seemingly so superior to the infinite malevolent Being who caused him to be, contemplates the hopeless misery of human life, thinks of the happiness God might have bestowed upon His creatures, and of the anguish He has inflicted upon them—upon the countless millions of beings whom He has caused to exist only to suffer; he is torn by powerless rage—rage inexpressibly embittered by the feeling that it *is* powerless; and instead of the love, the honour, the devotion he might have cherished for an Infinite Being who had exercised His power in producing happiness, his heart swells with unutterable hatred, loathing, and contempt—"contempt" for the Creator who, though He has so constituted him that to live is to suffer, has yet endowed him with such a strange indomitability of soul, that not even Infinite power can coerce that inner, that intense, ultimate core of the man, to do other than in his heart of hearts to despise a Being at once so infinitely powerful and so infinitely mean and cruel. You may compel me to *lie* to you, to prostrate

myself at your feet, to acts of the most servile humiliation, to offer up prayers to your power, to offer up even praises to your goodness; you may compel me to acts of cruelty almost comparable with your own, even to the immolation by fire of the child whose cries of imploring anguish tear my own heart with pangs equal to its own; nay—last, deepest, lowest degradation of all—you may bring your infinite power to bear upon my infinite weakness, till I may even be brought so low as to say, "I—I—love you," —but you cannot coerce my inmost self. Whatever I may do, whatever I may say, you cannot, by the exertion of all your infinite power, you cannot prevent me from—hating you.

If the pessimistic doctrine be true, we have no choice but to believe that God is malevolent, and that He created man with the intention that he should be for ever miserable.

But is that doctrine true?

CHAPTER IV.

PESSIMISM: OBJECTIONS.—UNCONSCIOUS WILL CANNOT DESIRE, SO CANNOT STRIVE.

THE most prominent preachers of Pessimism are Schopenhauer and Hartmann. Philosophically and theologically, Pessimism is based on Pantheism. In the previous volume I expressed my opinion of Pantheism, and gave my reasons for that opinion. One of the principal was that Pantheism is contradicted by the whole phenomena of existence—in especial, by the consciousness of every human being. Every human being practically feels that he is different from all other existences, and that all other existences are different from him. I believe, and shall endeavour to show, that Pessimism is a mistake.

Schopenhauer defines the Pan-theos, or the existence which he believes to be "Pan" or "All," as an "infinite unconscious will eternally rushing into existence." In his work already quoted from, "The World as 'Will' and 'Idea'" (p. 354), he writes:—

"The will [the pantheos], considered as purely in itself, is *without knowledge*, and is *merely a blind incessant impulse*,—as we see it appear in unorganised and vegetable nature and their laws, and also in the vegetative part of our own life, —*receives*, through the *addition of the world as 'idea,'* which is developed in subjection to it, the *knowledge* of its own *willing*, and of *what it is* that it 'wills,' and this [which at the time it *unconsciously willed* and now *knows*] is nothing else than the world as idea, life, precisely as it

now exists. Therefore we called the phenomenal world the *mirror* of the 'will,' its 'objectivity.'

"Will, is the *thing-in-itself*, the *inner content*, the *essence* of the world. Life, the visible world, the phenomenon, is only the mirror of the will."

Then if "*will*" is the "thing-in-itself," the "*essence* of the world," how can it be the "mirror" of the will, seeing it *is* the will? and being so, how can it be "objective" to the will, which is itself? He continues:—

"Therefore life accompanies the will as inseparably as the shadow accompanies the body; *and if will exists*, so will life, the world, exist. It is true, we see the individual come into being and pass away; but the 'individual' is only phenomenal . . . the 'individual' receives his life as a gift, rises out of nothing, then suffers the loss of this gift through death, and returns again to nothing."

According to Pantheism, there can, logically, be no individual who "rises out of nothing," to receive life as a gift, and then to "suffer its loss by death, and return again to nothing." What Schopenhauer calls the individual, is, if there be any meaning in Pantheism, merely a particular mode of existence of the Pan, the All. On the opposite page (355) he says: "The whole of nature is the phenomenon and also the fulfilment of the *will to live*." All is pan-theos, all phenomena are but particular and changing modifications of the infinite substance,—not of parts of it, but as a whole, for it has no parts, at least Pantheism says so,—the necessary consequence of which must be that every modification of the infinite substance must be aware of or know every other modification at one and the same time, for Pan is all, and all is Pan. Now, if *I* am a modification of the Pan—the All, then I ought to know all other modifications. But I don't: I know only myself, and know myself as different from all other things, and all other things as different from me.

The truth is, that what Schopenhauer calls an infinite will

is not a will at all. It is only a blind, unconscious, know-nothing, mechanical force. And that such a force could ever come to be conscious, to know, or could cause the world to be, or could cause life to be, is unsupported by even the shadow of a shade of evidence—nay, is contradicted by all fact. Only life can be conscious. Only life can will; and all experience, all experiment, all science, show that life comes only from antecedent life; that there was a time in the world's history when life did not, could not exist; that the new power, the new existence which we call life, must therefore have been created, caused to be, by a Being possessing the power to create it, to cause it to be, not as a mere modification of its own substance, but in *addition* to its own substance; who not only created life, but all things; and who is Himself infinite and eternal. Belief in that infinite and eternal Creator is called Theism. My reasons for holding that belief have already been given in the first part of this work.

A very brief reflection will show that, properly speaking, there is no such "*thing*" as "will," or "*a* will." But there is such an "*act*" as will-*ing*. "Willing" is an act which can be performed only by a conscious Ego. To will is to resolve, to intend, to purpose, and always has for its object the satisfaction of a desire; and such satisfaction is the cause, the reason of the act: willing, except as the consequence of desiring, is inconceivable. Now, as Schopenhauer's "will" is nothing but an unconscious force, it cannot possibly desire; and being incapable of desiring, it cannot strive to "satisfy" a desire. The ascription of willing, and consequent striving, to an unconscious force is absurd. Schopenhauer's "unconscious will" is an absurdity, and consequently all in his system which depends upon an unconscious force being able to "desire" and to "will" and to "strive" must be entirely rejected.

The necessities of his theory compel him not only to assert that the unconscious will strives, but all inorganic substances as well.

At page 398 Schopenhauer writes :—

"In all the grades of its manifestation, from the lowest to the highest, the 'will' dispenses altogether with a final goal and aim. *It always strives, for striving is its sole nature*, which no attained goal can put an end to. Therefore it is not susceptible of any final satisfaction, but can only be restrained by hindrances, while in itself it goes on for ever. We see this in the simplest of all natural phenomena, *gravity*, which does not cease to *strive*, and *press* towards a mathematical centre, to reach which would be the annihilation both of itself and matter, and would not cease, even if the whole universe itself were already rolled into one ball.

"A solid tends towards fluidity either by melting or dissolving, for only so will its chemical forces be free; rigidity is the imprisonment in which it is held by cold."

A solid, as such, has no tendency whatever towards fluidity. A solid will remain a solid unless its component molecules have their cohesity overcome by some adequate force. Its rigidity is consequent upon the mutual attractions of its molecules, not upon cold.

He continues: "The fluid tends towards the gaseous state, into which it passes at once as soon as all pressure has been removed from it."

Instead of which, fluid passes into the gaseous state only by the action of some force—heat, for example—sufficiently powerful to overcome the mutual attractions of its molecules.

Schopenhauer says above: "Gravity does not cease to *strive*, and *press* towards a mathematical centre." Gravity being only a non-living force, may indeed press, but it cannot "strive," it cannot "effort." Only living and conscious things can strive, can effort. Gravific action is not the result of any desire, of any volition on the part of that which acts. If a body be made to fall from a height, gravity, so long as it meets with no obstacle, causes the

body to move towards the centre of the earth. It causes motion. If a body—say a pound-weight—be laid on a table, it causes pressure. There was no "striving" in the motion, there is no striving in the pressure. Both are results of a non-conscious force acting in a fixed, unchangeable way, according to a law. Physical forces being unconscious are incapable of desiring, incapable of striving or efforting. *They cannot in any way vary either the mode or the intensity of their action.* But living things can do both. They can exert a larger or smaller amount of the force they possess, as may be most helpful in efforting to satisfy desire.

In the case of a kettle, with a loosely fitting lid, containing water just beginning to boil, we see the lid rise a little and then descend, rise again and descend again; so that there would seem to be a "striving" between the steam and the lid of the kettle. The steam seems to strive to lift the lid, the lid seems to strive to hinder the steam from escaping. But we know that there is no such striving, no such efforting. The lid being loose, the steam, —which is water converted into gas by the action of heat —when sufficiently powerful overcomes the gravity of the lid, and lifts it. But the lifting of the lid allows a portion of the steam to escape, and thereby so diminishes the upward pressure that it is inferior in force to the gravific force of the lid, and the lid drops into its place. The steam being thus prevented from escaping, accumulates till it is again sufficiently powerful to lift the lid, or even to blow it off altogether. The escape of a portion of it decreases the sum of its power, and the lid again falls. The repetition of these phenomena looks like a "striving" on the part of the steam and the lid respectively, but we know that there is none. It is simply the consequence of a varying amount of steam force acting in opposition to an unchanging amount of gravific force. There is no striving, no efforting.

Suppose a pair of suspended scales with six ounce-weights

in each scale: the weights being equal, the scale beam is horizontal. You take out of one scale a single ounce: the opposite scale falls a certain distance. You take out another ounce, it falls a little lower; another ounce, it falls still further. You put back the three ounces, and the scale descends till the beam again becomes horizontal. You take an ounce out of the other scale: the other end of the beam falls to exactly the same extent as when you took the ounce out of the first scale. You repeat the actions with identical effects. Each ounce always acts with the same force as each of the other ounces. The ounces do not "strive" to alter their action in any way whatever. They cannot, in the most infinitesimal degree, vary the mode or the intensity of their action. They are not capable of being conscious, consequently they cannot desire, consequently they cannot strive; they are, in fact, exactly like Schopenhauer's "unconscious will," which he foolishly says *can* strive, but which can really no more strive than the ounce-weights in the scales can "strive," because, like them, it is unconscious.

Look at the exactly balanced scales. Let us suppose that the present conditions remain unchanged: there is no motion, no change. Look at them for an hour, a week, a year, a million years,—for ever. There will *never* be any change, for they are lifeless.

Let us unhook one of the scales from the end of the beam, and attach a rope in its place. In the remaining scale let us place fifty pound-weights. Let the rope at the opposite end of the beam be in the hands of a man, and let the man pull the rope till the beam is horizontal. Let there be present in the mind of that man the "desire" *to keep the scale beam horizontal.* You take out, one after another, ten pounds: the beam does not move, it remains horizontal. You take out another ten pounds: the beam remains, as before, horizontal. You take out pound after pound till the scale is empty; still the beam remains horizontal. You replace

the fifty pounds. To the fifty you add ten, twenty, forty pounds; but the beam never moves, it continues throughout —horizontal; the man has his desire satisfied.

To be able to "strive," to "effort," that which strives or efforts must have *at its command* a certain amount of force, and must be able to use such force either all at once, or only such portion of it as that which strives needs for the attainment of a desired end. In the illustration used, the man varied the amount of force used so as exactly to balance whatever weight was on the opposite scale, the object being to satisfy his desire, which was—to keep the beam horizontal; and, in virtue of being able to *vary* the amount used, he kept the beam horizontal, he satisfied his desire.

Let us take another illustration: extreme efforting.

Let us suppose an occupied house at midnight. It is some distance from any other house or houses. The master of the house and his wife are asleep in a room on the first floor. The children and servants are asleep in various rooms above. One—the youngest, the best beloved—sleeps in the uppermost room of all. She has been reading in bed. She has fallen asleep with the unextinguished candle very near the bed-curtains—so near that a possible motion on the part of the sleeping girl may set them on fire. She makes that motion. The curtains burst into flames. The heat and smoke awake her. Paralysed by the horrible sight of the burning drapery, she utters a faint scream as she staggers out of bed and falls senseless on the floor. And the door is locked on the inside.

The girl's scream is loud enough to awake the mother; but, at first, she is confused by the sudden awaking—she hardly knows what has awakened her. She smells the fire. She frantically awakens her husband. He rushes to the nearest rooms, and finds the children asleep. They are quickly awakened by the mother. The father flies to the topmost chamber, where he finds, to his horror, that the door is locked on the inside. The smoke pours over the top of the

door. The father pushes hard, but without effect, against the locked door—pushes, with what seems all his force. He calls aloud,—no answer; he redoubles his "efforts,"—a little tongue of fire shoots through the smoke. He is maddened: desperately he thrusts against the door,—the heat increases. He retires to the opposite side of the landing, turns, and with a wild rush *flings* himself against the door, which this time gives way. Regardless of the flames, he rushes to his child, lifts her to his shoulder as if she were no heavier than a feather, flies rather than walks down the stairs, deposits his unconscious burden on a couch, and faints.

He has "efforted" with such intensity that he has used up the whole of his force, and pays the penalty by fainting and subsequent exhaustion.

Schopenhauer so entirely misconceives the nature and conditions of "striving" as to suppose that non-living existences are capable of so acting. The whole of physical science goes to prove that non-living substances cannot strive, or effort, or struggle. If they could, there could be no physical science at all: the unchangeable data upon which physical science is based would be lacking. Suppose given chemical attractions and given chemical repulsions attracting or repelling with one degree of force at one time and with a different degree at another, efforting according to the differing strength of the desire to attract or the desire to repel. Imagine chemical action being dependent upon the "moods" of substances; imagine cohesity capricious, polarity not to be depended upon, and gravity uncertain in its temper!

To be able to so use the physical powers that they shall serve their own ends. To be conscious. To feel. To think. To imagine. To desire. To will. To effort. To suffer. To enjoy. To make mistakes. To rectify mistakes. To do right. To do wrong. To be virtuous. To be vicious. To form a conception of Justice. To form a conception of Duty. To believe that to perform a perceived Duty is obligatory.

To sacrifice our own happiness to further that of others. To give birth or origin to creatures who shall possess all the powers we possess ourselves, but without our own powers being thereby diminished ; are some of the powers possessed by Life, but of which there is no vestige in the non-living ; which exists only for the sake of the living, and except in so far as it ministers to the use of the living is wholly destitute of value.

If we can be certain about anything, I think we may be certain that living, conscious existences are alone capable of desiring, of willing, striving, efforting, in order to satisfy such desires. With Life these abilities first make their appearance. They constitute absolute differences between the Living and the non-Living.

To call an unconscious force a will, and to assert that it can strive, is absurd.

Is Pessimism a reasonable doctrine?

CHAPTER V.

STRIVING OR EFFORTING IN RELATION TO PLEASURE AND PAIN.

THE first quotation I made from Schopenhauer I must here repeat, because it contains the essence of his doctrine of Pessimism :—

"We saw," he says, "that the inner being of *unconscious nature* [the "will"] is a constant *striving* without end and without rest. And this appears to us much more distinctly when we consider the nature of *brutes and man*. *Willing and striving is its whole being* : which may very well be compared to an unquenchable thirst. *But the basis of all willing is need, deficiency, and thus pain* : consequently the nature of brutes and man is subject to pain, *originally and through its very being*. If, on the other hand, it lacks objects of desire because it is at once deprived of them by a too easy satisfaction, a terrible void of ennui comes over it—*i.e.*, its being and existence *itself* becomes an unbearable burden to it. Thus its life swings like a pendulum backwards and forwards, between pain and ennui."

"The basis of all willing is need, deficiency—and thus pain. Consequently the nature of brutes and man is subject to pain, originally and through its very being."

Now, there can be no doubt that both brutes and man are "subject" to pain originally, and from their peculiar nature. But to be "subject to pain" means, not that that which is subject to pain is *always* in pain, but only at intervals, or it may be never. All men are subject to having the gout, but

only a few do have it. No doubt a need *may* be painful; but is a need *necessarily* painful? Schopenhauer speaks as if it were. A need means a want. If a man is conscious of a want, there naturally arises in him a desire to get that want supplied or satisfied; which leads to the willing to use such means, to make such efforts, as he thinks will result in such satisfaction. If the efforts be successful, if the satisfaction of successfully efforting and the consequent attainment of what was desired, together give pleasure greater than the pain of the need which gave rise to the desire, the willing, the efforting, the success, then it was an advantage to have had the pain; and that particular pain could not be considered an evil; and *not to have had that pain* might be called a "deficiency."

What is satisfaction, pleasure, happiness? It is to be in a state which I like to be in; to perform actions which I like to perform, either for their own sake or for the sake of desired results.

Schopenhauer says, "the basis of all willing is need, deficiency, and *thus pain*." That "need," "deficiency," are "thus pain," is only *half true*: it is the half-truth on which Pessimism is based. A given need or deficiency may be entirely painful, but it may also be entirely pleasurable. Two men may each "need" food. One of them may have had nothing to eat for—say two days. He had a good dinner forty-eight hours ago. After a few hours he begins again to feel a want, a need for food, which he desires to satisfy. He is unable to do so, and *that which at first was a pleasant feeling by increase becomes unpleasant*; and, as time passes, the unpleasantness deepens into positive pain, increasing in intensity until it becomes unbearable anguish. The other man also needs food. He is, we will suppose, a man in good circumstances. He has been working energetically, and comes home with an excellent appetite, and congratulates himself upon having it because he knows there will be a good dinner, and that he will thoroughly enjoy it. The

desire, the need, the want of food, the deficiency, is in itself pleasant to both these men. It is circumstances which determine whether the pleasure shall increase and shall endure while the need is gradually being supplied, or shall, in consequence of non-gratification, gradually become a pain, which may by degrees be so intensified as to cause death, death by starvation.

"Yes," says the Pessimist, "but you see how much greater was the pain arising from non-gratification than the pleasure arising from gratification." Quite true; but it is also true that it is only a minority who do not get a dinner every day, and it is possible, and daily becomes more probable, that there may come to be such an arrangement of things that every one will be certain of having his daily dinner, so that all the pain consequent upon the not having dinner will cease, while the pleasure of having dinner will remain.

To desire anything implies that what we desire is something that will give us pleasure, less or greater as the case may be. Therefore we "want" to have it. Therefore we effort to obtain it. But we can satisfy our desire only by using means. It is very seldom we can get what we want by a single effort. The use of means implies a longer or shorter series of efforts which we may call "minor" or "subsidiary" efforts, culminating in the "final" effort of the series by means of which we attain our desire. Suppose I desire to put my hand in my pocket, and that I may satisfy my desire by a single "subsidiary" effort—raising my hand to the level of my pocket—and the "final" effort by means of which I insert my hand into it. Suppose I commence business with a couple of hundred pounds, and with the desire to gain a competency upon which I may retire. That will be my "final" desire. How many "subsidiary" desires, leading to various effortings—some of them successful, some of them unsuccessful—will be needed to enable me to satisfy my "final" desire? Shall we say millions? It seems an absurd number, but a

moment's reflection will show that it is not so; *for every intentional act is—without any exception whatever—an effort consequent upon desire*, and each effort to satisfy each desire is, broadly speaking, successful or unsuccessful, and therefore is a cause of pleasure or pain. Supposing I gained my competency and retired from business, Pessimism would say, "No doubt he was awfully disappointed with the 'retired life' when he got it. No doubt the attainment of his desire gave him pleasure for a short time. But you know what would follow,—disappointment, ennui, and a miserable conviction that nothing is worth the trouble it costs us. There is no possibility of anything beyond a momentary happiness. All is vanity and vexation of spirit." *Pessimism reasons as if there were only two elements to be considered. I desire a competency. I get it. I am disappointed. All is vanity. Q.E.D.* It forgets the number of desires, and consequent effortings, of which that competency is the result, and that the greater number of these effortings must have been successful, and therefore that the pleasures must have been greater, very much greater than the pains; and that in my own case, at any rate, even supposing that the attainment of my desire to gain a competency did not give me as much pleasure as I anticipated, still the balance of happiness was greatly in my favour, and the fundamental principle of Pessimism that "need" or "desire" is always pain *is not true.*

Every successful effort—which implies the satisfaction of of a desire—brings us nearer to the possession of the great desire, the *final desire* of the series, *the only one recognised by Pessimism. The great delight of Life* is not alone the satisfaction of desires, but *the exercise of such powers as we possess* in *seeking* such satisfaction. Desires are the *occasions* of such exercise, for without desiring we cannot have that pleasure. Instead of being synonymous with suffering,—desiring, wanting, needing, are the *sine quâ non*

of enjoyments. To desire a thing is in itself pleasant—providing we think it is probable, or at any rate possible, that we may get what we desire. For we have the pleasure of anticipating the happiness we expect will result from the possession of what we desire. But at the same time it must be admitted that pleasure arising from possession cannot possibly be lasting; for we cannot desire—cannot *want*, that which we *have*. But that which we possess does not on that account cease to be of value, for in most cases it is, or at any rate may be, a necessary condition of the satisfaction of other desires.

Yes, says the Pessimist; it is all very well to refer to successful efforting as the cause of happiness, but in the case of the great majority of the miserable wretches we call men, the probabilities of disappointment are, as one may say, infinitely greater than of satisfaction. And this is not all. The pain of non-satisfaction may endure for an indefinite period—even the largest part of a man's life; while the cursed constitution of things, and man's relation to them, is such, that even if we do get what we desire, the resulting happiness is only momentary. When a desire is satisfied there is no longer any desire, for we cannot "want" what we *have*, and with "having" the pleasure necessarily ceases. So that the difference between the non-satisfaction of desire and its satisfaction is merely a short-lived pleasure, which almost immediately passes away; and even the attainment of the pleasure is almost always a disappointment, for the amount of pleasure derived is rarely, if ever, so great as was expected. Pleasure is a mere delusion, but there is no delusion in relation to pain.

The Pessimist says, "Nothing is worth the trouble it costs us," *whereas it is the trouble itself which gives the greatest amount of pleasure*,—providing it gets for us what we desire. The getting what we desire is only the last of a longer or shorter series of efforts, many of which, it is true, may have been unsuccessful; but those which *have*

been successful have been sufficient to lead up to the final successful effort which gave us what we desired. Successful efforting constitutes the great happiness of life ; unsuccessful efforting constitutes its misery. Despair is the belief that all your efforts, however you may strive, will be unsuccessful, and that hence it is of no use to effort. Hope is the belief that your efforts will be—more or less—successful, and may lead eventually to the satisfaction of desire. With the majority of men hope ceases only with life. They expire together.

CHAPTER VI.

HARTMANN—WORK—PLAY-WORK—IS GOD INDIFFERENT TO HUMAN MISERY?

PERHAPS the most false and pernicious of all the principles of Pessimism is "that nothing is worth the trouble it costs us." At page 25, vol. iii., of the "Philosophy of the Unconscious," Hartmann writes—

"The most usual filling up of life is work. There can be no doubt that 'work' for him who must work is an evil, for nobody works who is not compelled—*i.e.*, who does not take work upon himself *as the lesser of two evils*, whether the greater evil be *want*, the *torment of ambition*, or even mere *ennui*,—or who has not the intention through undertaking this evil to purchase for himself greater 'positive good.' All that can be said of the value of work reduces itself either to economical advantages, or to the avoidance of greater evils; and the utmost that man can attain to is, 'that he should rejoice in his own works,' for that is his portion—*i.e.*, that he should become habituated to bear the inevitable as well as possible, as the cart-horse at last draws the cart with tolerable good humour. At work man consoles himself with the prospect of leisure, and in leisure we have to console ourselves with thought of work. Thus the alternate play of leisure and work comes to this: that the sick man turns himself in his bed to get out of the uncomfortable position, but soon finds the new position just as uncomfortable, and so turns back again."

Oh lame and impotent conclusion! Being so near the truth, how could Hartmann help seeing it? Instead of

"work" being an "*evil*," it is the "*great good*," and is the source of all blessings. Work means efforting, efforting is the result of desire, and when successful brings happiness, not only in the gaining of what we desire, *but that happiness attends the efforting itself by which we gain. But the happiness consequent upon the gain of what we desire is benevolently made to be not lasting.* If it were, there could be no progress, no increase of desires, no increasing possibilities of happiness. The more wants, the more desires we have, the more numerous are the possibilities of happiness. Look at the fewness of the wants of a pig. Hunger, thirst, sex, satisfactory temperature, security from enemies. What else has he to desire? Nothing.

Continued efforting leads to fatigue, as well as the attainment of what we desire. How delightful is rest, following labour,—merely doing nothing is not rest,—how pleasant the feeling of fatigue passing away, of vigour returning!

Mr. Hartmann seems totally unconscious of the great fact that there are two kinds of work, one of which may be called "*work*"-*work*, the other "*play*"-*work. That there is such a word as "play" amounts in itself to a refutation of the doctrine of Pessimism. It is work done, principally, for the sake of the pleasure experienced in doing it.* Were it not that efforting has to be so often done during the suffering of pain, and in spite of the pain—were it not that so much of efforting is unsuccessful—were it not that increase of desires may lead to increase of *pains* as well as to increase of pleasures—life might be almost full of happiness, for to "*rejoice*" in his own "*works*" is the "*portion*" of man; but how many are kept out of their portion, whose lives are a long series of almost wholly "unsuccessful" and painful effortings! But with that aspect of things I am not at present concerned, but in endeavouring to show that existence, instead of being another name for suffering, is, or may be, but another name for enjoyment,—for enjoyment largely mingled with suffering, it is true, *but such suffering is not*

a "necessity" of existence, as is affirmed by the pessimist; indeed, it seems clear that the largest portion of suffering, instead of being inherent in the "nature" of things, may be more or less completely remedied. As it is, life can be maintained only by continuous efforting. But every living creature is an instance of *successful* efforting. If its efforts were not more of them successful than unsuccessful, it could not *be* living.

Schopenhauer, "Parerga," ii., p. 313, says (evidently thinking he advances an unanswerable argument in support of Pessimism):—

"Whoever wishes to put to a brief trial the assertion that in the world enjoyment outweighs pain, or at least is in equipoise to it, should compare the sensation of the animal which devours another, with that of this other."

We may concede that in the instance given, the pain of the devoured may immensely exceed the pleasure of the devourer. But such a bare statement does not cover the facts. Animals pass their lives surrounded by enemies. Certain causes tend to terminate their lives: insufficient food, disease, being killed by those who desire to eat them. So long as an animal *lives*, none of these causes can have been sufficient to cause death. Though surrounded by enemies, it must have hitherto escaped them. It is doubtless disagreeable to be pursued by some enemy who wants to kill and eat you; nevertheless, it is pleasant to escape. The hunted fox is not always caught, even though the odds are so tremendously against him. At the commencement of the chase, when the fox gets away, we can imagine it to experience a feeling of very great enjoyment. So long as he perceives that the distance betwixt himself and his pursuers does not decrease, and is at the same time conscious that if he were to put forth all his force he could soon get out of danger, he may be in a state of pleasing excitement,—increasing if he escapes, but if the hounds gain upon him turning to pain,—pain which must increase to anguish as he perceives his

chance of escape growing less and less. But he still has his brains to rely upon: the stupid hounds have little invention, little intellectual power, and he may baffle them yet. If he fail, if all his wiles prove unsuccessful, and his savage enemies—the monstrous combination of dogs, horses, and men—at last overtake, overwhelm, and tear him to pieces, he dies nobly, and may be moved by an emotion of inexpressible scorn and contempt for all those who have a hand in his death; should he escape, should his "effortings" be "successful," we can imagine him gleefully relating to his family and friends how he outwitted those who so cruelly sought his life.

How many successful efforts he may have made! how many hen-roosts he may have depopulated, how many turkeys, geese, ducks, which should have ministered to the needs of that horrible creature man, have been appropriated by himself! His life has been but another name for gratified desires and enjoyments. Though he may have had occasionally to go without his breakfast, his life has, upon the whole, been very pleasant. He has had many successes, and he dies but once.

What we have said of the fox is more or less true of all living creatures. In order to keep alive they *must* have had many successful effortings—that is, many pleasures. They may have had many pains; but it cannot be doubted that upon the whole there must in life be more pleasure than pain.

Mr. Hartmann seems entirely to misconceive the nature of "content." Content does not mean that a man has no desires, no wants, to gratify; but that he does not desire a greater number of desires and gratifications than he possesses. One man is content with, say, twenty wants and their gratifications; another is "contented" only with a hundred.

In so far as Pessimism asserts the existence of much misery, it is correct. In so far as it attempts to show that

misery is a "necessary" outcome of the nature of things and of their relations to each other, I think Pessimism is as wrong as it is possible to be.

In reply to which it may be said,—Even though you could prove—which may be considered very doubtful—that the total amount of pleasure exceeds the total amount of pain, still there *is* pain. Why *should* there be pain? If God were really benevolent, would there be any pain? God, you assert, created all life. He created all the conditions and circumstances amidst which and by means of which life exists; and yet there is an inexpressible amount of misery. If He had been merely the "Great Architect," the mere "Arranger" of matter and force already existing, and in relation to which His power was limited, we should be at liberty to suppose, with some thinkers, that God did the best He could under the circumstances, and therefore cannot be blamed for the unsatisfactory results; for He might have *wished* to make man completely happy, but being unable to do so, made him as happy as He could. But your assertion that God not only "arranged" all things, but that He also "created" all the things which He arranged, shuts you out from any benefit that might be derived from such a supposition. Unless you can give sufficient reasons for believing that the total sum of pain, past, present, and to come, is not inconsistent with perfect benevolence, we have no choice but to believe that the Creator—though not so malevolent as He might have been, seeing that the sum of pleasure is, or at any rate may be, greater than the sum of pain—must yet be at least considered negatively malevolent, inasmuch as, of His own will, He caused creatures to exist whom He knew would be not only not perfectly happy, but some of them so extremely miserable that life, instead of being a blessing, would be but another name for continuous pain, and to which pain He seems to be entirely indifferent. All conscious creatures desire happiness; all dislike pain.

They do so because they have been so constituted by the Being who created them. Can a Being who, simply because He pleases, causes the desire and yet does not provide for its gratification, be called *Just*?—leaving out all benevolence—which means giving some good to a receiver who has no "right" to such good. There are certain persons from whom we hear a great deal about our duty to God, and about our obligations to Him. What is God's duty to man? Is it not, at the very least, Justice? Why did God create man? What was His reason, His object? Was it in some way for His own benefit, for His own glory, or for the benefit of that which He created? Was His "object" selfish, or was it benevolent? "Why does man exist?"

Awful questions, put in no irreverent spirit, but questions which must be answered.

We have, when our judgment is not influenced by selfish considerations, a very clear, a very perfect conception of Justice and of Goodness. Many human beings have a most exalted ideal of what constitutes a perfect man,—all his actions just, benevolent. Is it possible that the Creator shall fall short of this ideal of the being He has caused to be?

"Shall mortal man be more just than God? Shall a man be more pure than his Maker?" *

"Shall not the Judge of all the earth do right?" †

* Job iv. 17. † Gen. xviii. 25.

CHAPTER VII.

THE PROBLEM "WHY DOES MAN EXIST?"—THE RELATIONS OF SOUL TO BODY.

WE have endeavoured to discover the origin of life, and to the question "What is man?" we have found the answer to be—Man is the highest development of the power Life; and life and all other things owe their existence to an Infinite Omnipresent Being, in and with whom they co-exist, and whom we call God.

When we ask *why* the Infinite Being caused things and man to exist, we fall into seemingly insurmountable difficulties and perplexities. All conscious creatures desire happiness, but none are completely happy,—some so little happy that their lives seem nothing but pain. That there is some happiness implies benevolence in the Creator. The unhappiness implies malevolence, or at the best indifference. It does not imply inability to have so created life, and things, and their relations to each other, that happiness should have been universal and complete. We cannot think of the Infinite Creator as having been *unable* to make all creatures happy. Why, then, has He *not* made them happy?

To human thought how easy it is to imagine such differences in man, and the conditions amidst which he lives, as should have made his existence an almost continuous happiness!

Suppose climatic and other conditions should have been such as to render the production of an abundant supply of food and other necessaries to result from such an amount

of "efforting" as should have been only pleasurable; suppose the multiplication of Life should have been so limited that the horrible difficulties and miseries arising from over-population could not by any possibility occur. Under such conditions it would seem that human happiness might have been indefinitely increased; no wonderful amount of infinite power and wisdom being apparently needed to bring about a "consummation" so "devoutly to be wished." The question—Why has the Creator not made man happy?—constantly presents itself, constantly demands an answer.

If we proceed to consider, not only the origin of man, but his nature and constitution, and the manner of his development, it may possibly help us to understand why God created those things and circumstances which led to the evolution of man; and also why He did not so constitute the things and circumstances amidst which He placed him as to result in his being happy?

The answer we have so far found to the question, "What is Man?" is—that he is the highest development of the "Power" we call "Life."

We say—"He" is the highest development of the Power we call Life. But what, and which, and where is the "He"? Does the said "He"—let us look at a man—does the "He" include the whole of what we "look at"? Is a man's leg a part of "*Him*"? A moment's thought will clearly show that neither his legs, nor his arms, nor his eyes, nor his nose, nor his ears, nor his tongue, nor his lips, are really "parts" of "Him," for of all these a man may be deprived, without being in any way changed in what we call "He,"—"Himself." Nay, we can do more: we can starve him till he loses a further and very considerable portion of himself, and the essential "He" suffers no diminution. Those things, therefore, are not parts of the man. If they were, he would be so much less by their loss. But he is not. He remains exactly what he was before we operated upon him.

Does the He, the Ego, the I, the soul, the mind, then, only *inhabit*, only *use*, that which we call his Body? Though he is certainly not everywhere in his Body—seeing we can deprive him of so much of it without *his* being anything the less for the loss—still he must be *somewhere* in it. Where is that "somewhere"? Well, that "somewhere" is generally considered to be in the head, the brain, or, to speak more accurately, in the cerebro-spinal axis. But does he exist in the *whole* of the "cerebro-spinal axis"—which includes the "spinal marrow," etc.—or only in the brain or cerebrum? or does he exist in only a *part* of the cerebrum? If only in a part, what is the extent of that part, where is its special locality, and what are its relations to the other parts of the cerebro-spinal axis, and also to all the various parts of the body?

We speak of the "man" as the I—the Ego—the soul—the mind—the spirit. But when we use those terms, what is it that we precisely mean by them? Are they three entities, or only one? And are all three—supposing we think there *are* three—are they each and all different from what we call "Life," or are they only modifications or states or phases or developments of life?

When we ask these questions we generally get either no answers at all, or such answers as seem to contradict one another.

If we suppose body and soul—supposing there *is* a soul—are different things, and that the soul is only the inhabitant of the body, then we want to know whether they came into existence simultaneously, or in succession? If in succession, then we want to know how long the body exists before the soul takes up its residence therein; and also from whence the soul comes.

If we further suppose that, in addition to the body and the soul, there is another something, which we designate as "spirit" or "mind," we also want to know where *it* comes from, and when *it* first makes its appearance. We also want

to know whether other animals beside man possess souls, and also whether *they* possess minds; and whether there is any difference between the souls and minds of animals—supposing we suppose them to be possessed by animals—and the souls and minds of human creatures?

If, in order to reduce the number of these difficulties, we suppose Soul and Life to be interchangeable terms, then we cannot avoid the inference that *all* living existences must have souls—even plants!

Until we can answer these questions, we cannot be said to "know" much about the real nature and constitution of a man.

There is also something yet to be considered—Death.

Though we can deprive a man of so large a portion of his body without that which we call "He" suffering any diminution, there is nevertheless a point beyond which we cannot go without his—Dying!

What is the true meaning of Death? Is there in the Body a "something" which we call the Ego, the I, which is different from the Body, which can leave the body, and the result of whose departure we call—Death?—or is there no such "something"? Is what we call the Ego—the soul, the spirit, the mind—only a name or names for the co-ordinated action of these wonderful chemical and physical combinations whose result is—a living body?

Our previous study of the origin of life, and the conclusion to which we were compelled to come, enables us to answer in the negative that last supposition. There *is* a "something" in a man's body which is *not* the result of mere chemical and physical combinations, but of the "Creational causation" of Infinite, omnipresent God. Whether that "something" continues to exist after death; whether that existence, if it does exist, will be limited or eternal; whether it will be a state to be desired or to be dreaded; whether our conduct in this world will influence it for good or for evil, we shall hereafter have to consider. At present our object

is to study the origin, the evolution, the *nature*, the *constitution* of man, so as to arrive at a definite conclusion—if we can—as to the character of God, and His motive for creating man. We have already seen reason to believe that God is not malevolent, though He may seem to be indifferent to the fate of man. We want to discover—if it be possible to us—*why* God caused man to exist, and whether he owes that existence to the Benevolence, the Love, of God, or to convince ourselves that the problem does not admit of solution. Did God create man for man's own benefit, or for the benefit of Himself? Was God's motive selfish, or was it benevolent? Is man Free, or is he under the dominion of a Necessity so absolute that whatever be his conduct, it could not have been other than what it has been in the past, what it is in the present, and what it will be in the future?

It would seem to be impossible to attain to any complete understanding of man's nature and constitution without first investigating, to the very best of our ability, the processes of Evolution of which he is the result, and coming to some distinct conclusion as to *how* that evolution was effected; the relations which the various parts of his body bear to each other and to himself, and what part or parts of the man constitute what we call Himself, and how it is that, notwithstanding he is a multitudinously multicellular organism, every man has an indestructible consciousness, belief, conviction, knowledge, feeling—call it what you will—that he is a person, an individual, absolutely and entirely different from all other existences; that for each man the total sum of existences consists of two factors—*Himself*, and *everything else*.

CHAPTER VIII.

ANIMAL AND VEGETABLE CELLS FUNDAMENTALLY ALIKE.—IS THE VEGETABLE CELL CAPABLE OF CONSCIOUSNESS?

In our endeavour to solve the problems indicated it will be necessary to commence with the consideration of the lowest manifestation of life—the single cell; to study its nature and properties, and how it is that its nature and the action of its properties, subject to the action of external circumstances, have caused the various modes of evolution which have found their highest expression in man.

All living existences have a similar commencement, and consist of organisms composed either of a single cell, or of a smaller or larger plurality of cells; they are either unicellular or multicellular. But every organism commences its existence as a single cell; which consists of a mass of naked protoplasm containing a nucleus or central portion, which presents a somewhat different appearance to the rest of the cell.

The world of living existences is by science divided into the vegetable kingdom and the animal kingdom.

Between these two kingdoms there are said to be two great fundamental differences.

The vegetable can convert mineral and gaseous substances into protoplasm, and does not possess consciousness.

The animal cannot convert mineral and gaseous substances into protoplasm. It is dependent for its food on substances which have been converted into protoplasm by vegetables; and it possesses consciousness.

But the differences described are in many cases very indistinct. So indistinct, that it is often impossible to say with certainty whether a given organism belongs to the kingdom of plants or to the kingdom of animals.

The most certain difference between the vegetable and the animal is supposed to be the absence of consciousness in the former, and its presence in the latter. Whether that supposition has a foundation in fact may, I think, be doubted; possibly a searching examination may show that such difference between vegetable and animal does not exist, and that the only difference between animal and vegetable is not difference in nature and properties, but is only a difference in development.

Before attempting any answer to the question whether the plant is capable of being conscious, we must acquaint ourselves with the fundamental properties, the structure and the functions of the simple cell.

In his larger work entitled "A Text-Book of Physiology" [*Animal*], Professor Foster writes, p. 1:—"Amongst the simpler organisms known to biologists, perhaps the most simple as well as the most common is that which has received the name of amœba. There are many varieties of amœba . . . but all possess the same general character. Closely resembling the white corpuscles of vertebrate blood, they are wholly, or almost wholly, composed of undifferentiated protoplasm, in the midst of which lies a nucleus, though this is sometimes absent. In many, a distinction may be observed between a more solid external layer or *ectosarc*, and a more fluid granular interior or *endosarc*; but in others this primary differentiation is wanting. By means of a continually occurring flux of its protoplasmic substance, the amœba is enabled from moment to moment *not only to change its form, but also to shift its position.* By flowing round the substances which it meets, it, in a way, *swallows them*; and having *digested* and *absorbed* such parts as are suitable for food [*how does it know*

what parts are suitable and what are not?] ejects, or rather flows away from, the useless remnants. It thus lives, moves, grows, and after a time dies, having been during its whole life hardly anything more than a minute lump of protoplasm. Hence, to the physiologist it is of the greatest interest, *since in its life the problems of physiology are reduced to their simplest forms.*

"Now, the study of an amœba, with the help of knowledge gained by the examination of more complex bodies, enables us to state that the undifferentiated protoplasm of which its body is so largely composed, exhibits certain fundamental phenomena which we may speak of as vital."

That is, that these "fundamental phenomena" are the effects of something present in the amœba which is over and above—which is *plus*—the phenomena caused by the merely physical "powers," gravity, chemical attractions, chemical repulsions (grouped together as chemical affinities), cohesity, elasticity, polaricity; that these physical powers can be dominated and used for particular purposes by the vital power Life, whose most remarkable properties are the capability of being conscious and of efforting; and that when the power Life quits the protoplasm, the protoplasm—being in itself merely a combination of physical substances—can no longer exhibit any of those phenomena spoken of by Professor Foster as "vital."

We proceed with Professor Foster's description of phenomena, as manifested by the living minute mass of protoplasm.

"1. It [the amœba] is *contractile.* There can be little doubt that the changes in the protoplasm of an amœba, which bring about its peculiar 'amœboid' movements, are identical in their nature with those which, occurring in a muscle, cause a contraction. The substance of the amœba may therefore be said to be *contractile.*

"2. It is *irritable* and *automatic.* When any disturbance such as contact with a foreign body, is brought to bear on the amœba at rest, movements result. These are not

passive movements, the effects of the push or pull of the disturbing body, proportionate to the force employed to cause them, but active manifestations of the protoplasm.

"Any 'living' matter which, when acted on by a stimulus, suffers an explosion of energy, is said to be 'irritable.'

"The amœba (except in its prolonged quiescent stage) *is rarely at rest. It is almost continually in motion.* The movements cannot always be referred to changes in surrounding circumstances acting as stimuli; in many cases the energy is 'set free' in consequence of *internal* changes, and the movements which result are called spontaneous or automatic movements. We may therefore speak of the protoplasm as being *irritable* and *automatic.*

"3. It is *receptive* and *assimilative.* Certain substances serving as food are received into the body of the amœba; and there, in large measure, are dissolved. The dissolved portions are subsequently *converted from dead food into protoplasm*, and become part and parcel of the substance of the amœba.

"4. It is *metabolic* and *secretory. Pari passu* with the reception of new material, there is going on an ejection of old material, for the increase of the amœba by an addition of food is not indefinite. In other words, the protoplasm is continually undergoing chemical change (*metabolism*), room being made for the new protoplasm by the breaking up of the old protoplasm into products which are cast out of the body and got rid of.

"The energy expended on the movements of the amœba is supplied by the chemical changes going on in the protoplasm by the breaking up of bodies possessing much latent energy into bodies possessing less. Thus the metabolic changes which the food (as distinguished from the undigested stuff mechanically lodged for a while in the body), undergoes in passing through the protoplasm of the amœba are of three classes: those preparatory to and culminating in the conversion of the food into protoplasm; those

concerned in the discharge of energy; and those tending to economise the immediate products of the second class of changes, by rendering them more or less useful in carrying out the first.

"5. It is *respiratory*. Taken as a whole, the metabolic changes are pre-eminently processes of oxidation. One article of food—*i.e.*, one substance taken into the body (viz. oxygen)—stands apart from all the rest; and one product of metabolism peculiarly associated with oxidation (viz. carbonic acid) stands somewhat apart from all the rest. Hence the assumption of oxygen and the excretion of carbonic acid, together with such of the metabolic processes as are more especially oxidative, are frequently spoken of together as constituting the respiratory processes.

"6. It is *reproductive*. The individual amœba represents a unit. This unit, after a longer or shorter life, having increased in size by the addition of new protoplasm in excess of that which it is continually using up, may, by fission or by other means, resolve itself into two (or more) parts, each of which is capable of living as a fresh unit or individual.

"Such are the fundamental vital qualities of the protoplasm of an amœba: all the facts of the life of an amœba are manifestations of these protoplasmic qualities in varied sequence and subordination.

"*The higher animals*,—we learn from *morphological* studies, *may be regarded as groups of amœbæ peculiarly associated together*. All the *physiological* phenomena of the higher animals are similarly the results of these fundamental qualities of protoplasm peculiarly associated together. The dominant principle of this association is the physiological *division of labour* corresponding to the morphological *differentiation of structure*.

Page 4.—"These groups of cells, thus distinguished from each other at once by the *differentiation of structure*, and by the more or less marked *exclusiveness of function*, receive the name of 'tissues.'"

Page 5.—"We may therefore consider the complex body of a higher animal as a compound of so many 'tissues' [muscular, nervous, secretory, excretory, digestive, metabolic, etc.], *each tissue corresponding to one of the fundamental qualities of protoplasm*, to the development of which it is specially devoted by the division of labour."

In his article "Physiology," *Encyclopædia Britannica*, Professor Foster, after summing up the properties as above enumerated, adds :—

"These fundamental characters, all associated with the double upward and downward series of chemical changes of constructive and destructive metabolism [hereafter to be considered] are present in protoplasm wherever found."

"Wherever found"!

Then, as *all* life, whether plant or animal, begins with protoplasm, it would seem necessarily to follow that there is *no fundamental difference* between the protoplasmic unit of the animal and the protoplasmic unit of the plant.

Now, we *know* that animals are capable of being conscious: are plants also capable of being conscious?

If, in the late afternoon of some supremely lovely summer's day, we saunter, say into Hyde Park, during the height of the "season," and observe the various manifestations of life which are there present, the answer to the question just propounded would seem to be entirely in the negative. Everywhere the highest results of animal and of plantal evolution present themselves, and results seemingly more entirely different it would be difficult to imagine.

On the one hand we observe the very highest results of animal evolution. In the crowds of beautiful women and handsome men may be observed some of the very crowning glories of animal life: countenances of women which beam with sweetness, refinement, and intellectual expression; exquisite tints of eyes, hair, complexion, graces of motion, gait, and even strength; some delicate-looking girl, who seems to be made up of softness and sweetness, is seated on

another of the most beautiful exhibitions of animal development—a horse, full of strength and spirit—whose vivacity and exuberance of vitality seem so overpoweringly superior to the gentle creature whom he bears, is yet governed and directed by her with the utmost ease and fearlessness; for she knows that, great as are the differences of strength, she is his master. She feels that, even if their desires come in collision, and should result in a struggle for supremacy, it is not this great, beautiful example of one of the noblest forms of animal force, that will conquer—but herself: not only conquer, but in the very act of conquest will experience one of the greatest of pleasures; for mind, lodged in that slender girl, will be too much for mere muscular force.

Observe the pet dogs on the laps of some of those who are gently moving along in carriages,—the beauty and exquisite finish of which seem to equal if not to surpass that of nature itself. See the birds skimming rapidly through the air, the insects which dart to and fro; observe all the indications of life and consciousness presented by that crowd of living, moving beings. At present we say nothing of the higher development, the higher evolutions of mechanical ingenuity, of taste, of imagination, of thought, which find their expression in the various phases of the scene before us, and in the actors who bear their part in it.

Turn we to those other, those plantal manifestations of life, which meet our gaze: the noble trees, some of which have existed for centuries—the oaks, elms, beeches; the shrubs, the exquisite flowers, with all their splendour of colour and beauty of form and sweetness of odour; the grass, close-shaven, or allowed to grow as it will, down to the humble plants whose minuteness renders them almost invisible to the unassisted eye; and from these to the very humblest, which live and flourish beneath the tiny wavelets of the Serpentine.

What is it that most strongly strikes us, as we take in

these presentations of the two great forms of life—the animal and the plantal?

It is the wonderful contrast of motion and rest. The animal life is full of action, change, variety. The plant,—unless in its more delicate parts, its slender terminal shoots, or its various and tender leaves, gently *moved* by the summer breeze—are all fixed, motionless, passive. We know, however, that in reality they are not entirely so, for we know that they are born, live, grow, fade, and die; and we know that animals do the same. But we know that animals are capable of being conscious, that they have desires, preferences, dislikes, hopes, fears, pains, pleasures, sensations, imaginations, thoughts. We know that their changes, motions, varieties of action, are consequent upon such pains and pleasures, desires and aversions; and we also know that without "consciousness" such feelings, actions, emotions, thoughts, are impossible.

The contrast and difference between the animal and the plant, so far as the capability of being conscious is concerned, seems to be absolute. To most people the mere supposition that plants might be conscious would appear absurd.

Is it "absurd"?

We have considered the *differences* between the plant and the animal: let us see what *likenesses* there may be. Professor Foster, as we have seen, describes the "minute lump of protoplasm, the amœba—the commencing form of all animals"—as being

1. Contractile;
2. Irritable and automatic;
3. Receptive and assimilative;
4. Metabolic and secretory;
5. Respiratory;
6. Reproductive.

How far is this description applicable to plants?

Let us consult Dr. Vines' admirable work on the Physiology of Plants.

At the commencement of the introductory chapter (p. 1) Dr. Vines writes:—

"If a drop of the rain-water which has collected in a water-butt be examined under the microscope, a number of minute, somewhat pear-shaped bodies of a green colour will be seen actively swimming in it. These bodies are what are termed the zoospores of a small alga, *Hæmatococcus pluvialis*, better known as Protococcus. The rapidity of the movements of these bodies makes it difficult to observe their structure, but if a trace of iodine be added to the drop of water, they will be brought to rest. It will then be seen that they are not all quite alike, some being smaller and others larger. The smaller ones consist of a minute mass of jelly-like substance, granular, and coloured green for the most part, but clear and colourless at the more pointed end, where it is prolonged into two delicate filaments termed *cilia*; the larger ones have the same structure, but they possess, in addition, a membrane through which they protrude. To this jelly-like substance the name *protoplasm* has been given; and, on account of its universal presence in living organisms, it has been described as the *physical basis of life*. It usually occurs, as in these cases, in the form of minute individualised masses, each mass being termed a *cell*. The membrane which surrounds the protoplasm of the larger zoospores is the cell-wall, and it may be shown by appropriate tests that it consists of a substance known as *cellulose*; *an investing membrane of this kind is present in the great majority of plant-cells*; its presence is, in fact, the general rule, but it is not absolutely essential. *The essential part of a living cell is its protoplasm, the cell-wall being a 'secondary' formation, a 'product' of the 'vital activity' of the protoplasm.* This relation between protoplasm and cell-wall can be well made out by observing the subsequent changes which these zoospores undergo.

After moving actively for a time they come to rest, lose their cilia, acquire a spherical form, and the protoplasm surrounds itself with a firm '*cellulose*' *membrane*, each such non-motile plant constituting a hæmatococcus plant. After a time, if the external conditions are favourable, the protoplasm divides into a larger or smaller number of segments, the cell-wall is ruptured and the segments of protoplasm are set free as actively-moving ciliated cells (zoospores) *destitute of a cell-wall*—that is, as *primordial cells*. It is during their motile period that the larger zoospores clothe themselves with a 'cell-wall' as described above."

It will be conducive to the better understanding of our subject if I place before the reader the meaning of the word "zoospore," as given in Ogilvie's Dictionary :—

"Zoospore, *n.* [Gr. *zōon*, an animal, and *spora*, a growing seed], a spore occurring in *cryptogamic plants*, which, having cilia or long filiform moving processes projecting from its surface, moves spontaneously for *a short time after being discharged from the spore-case of the parent plant*. Their cessation from motion after a time permits the seed to become fixed in order to germination. Zoospores occur in characiæ, algæ, fungi, and lichens" [the lowest forms of plants].

To return to Dr. Vines :—

"In considering the life history of Hæmatococcus we observe that *it maintains itself*, that *it reproduces its kind*, and that at one period of its life *it is endowed with the power of active motion* : phenomena which necessarily imply that the organism is constantly obtaining supplies of matter and of energy from without. The organism exhibits these phenomena, or rather it performs certain functions of which the phenomena are the outward and visible sign, in virtue of certain '*fundamental properties*' with which its protoplasm is endowed, properties which are possessed likewise—some in a higher, some in a lower degree—*by the protoplasm of all living plant-cells*. It is necessary, therefore, in

commencing the study of the physiology of plants—the study, that is, of their *functions—to ascertain what are the fundamental properties of their protoplasm.*

"An acquaintance with the fundamental properties of protoplasm in virtue of which the *processes of nutrition* are effected may be perhaps most readily acquired by making a series of observations upon some small simple plant which can be obtained in quantity, and of which the structure is known. The Yeast-plant (*Saccharomyces Cerevisiæ*) may be conveniently taken for this purpose. If a drop of yeast be added to a quantity of a liquid known as Pasteur's solution, which consists of distilled water holding a small percentage of certain inorganic salts and a larger percentage of certain organic substances in solution, it will be found that the 'Pasteur's solution,' which is clear at first, becomes turbid if allowed to stand for a few hours in a warm place. A drop of it examined under the microscope will be seen to contain a great number of yeast-cells, and it will also be seen that the cells are actively multiplying by the formation of small out-growths which gradually enlarge until they attain nearly to the size of the parent cell, when they become detached and constitute new individuals. It is evident that an enormous multiplication of the yeast-cells originally introduced into the 'Pasteur's solution' has taken place, and this necessarily implies that a considerable quantity of protoplasm and of cell-wall has been formed. If, in a second experiment, a drop of yeast be added to a quantity of *pure distilled water*, the liquid will not become turbid—that is, there will be no indication of any increase in the number of yeast-cells present; and not only so, but it will be found, after a time, that their protoplasmic contents have perceptibly diminished, so that an actual loss of substance has taken place.

Page 4.—"The inferences to be drawn from these observations are: (1) that the substances contained in the 'Pasteur's solution' are of such a nature as to supply the

yeast-cells with the materials necessary for the formation of protoplasm and of cell-wall—that is, to serve as food for the plant; (2) that the yeast-cell is capable of absorbing these substances and of elaborating from them protoplasm and cell wall, and that it does so to such an extent as not only to provide for its own maintenance, but also for the formation of new yeast-cells; and (3) that there are processes going on in the yeast-cell which tend to diminish its substance.

"The protoplasm of the yeast-cell—*and this is true of every living organism*—is the seat of active chemical processes which are inseparably associated with the *vital* activity of the protoplasm. These collectively may be termed the 'metabolism' of the organism.

"We are now (p. 5) in a position to make some definitive statement as to the '*fundamental properties*' with which the protoplasm of the yeast-plant is endowed:

1. It is *absorptive*, in that it is capable of taking up into itself the substances which constitute its food;
2. It is *metabolic*, in that it is capable of building up from the relatively *simple* chemical molecules of its food the *complex* molecules of the organic substances present in the cell; and that it is capable of decomposing the complex molecules of these substances into others of simpler composition;
3. It is *excretory*, in that it gives off certain of the products of its destructive metabolism;
4. It is *reproductive*, in that portions of it can become separate from the remainder, and lead an independent existence as distinct individuals.

"These are, however, by no means *all* the fundamental properties with which the protoplasm is endowed. The observation of the zoospores of Hæmatococcus naturally suggests that their *motility* is due to some *peculiar property*

possessed by their protoplasm; and this is in fact the case. When a zoospore is actively moving, its pointed hyaline end bearing the cilia is directed forwards, and at the same time the cell revolves round its long axis, so that it advances in a screw-like manner. The movement is entirely due to the cilia. So long as the organism is in motion, the cilia are vibrating so rapidly that it is difficult to see them. The lashing movements of the cilium are probably effected by the alternate rapid *shortening of each longitudinal half*. To this rapid 'shortening' the term *contraction* has been applied, and the body exhibiting it is said to be *contractile*. Since the cilia are merely specialised portions of it, we may attribute to the protoplasm of these cells the 'fundamental property' of *contractility*.

"Further, it appears that the 'movements' of the cilia originate independently of any external conditions which might act as exciting causes or *stimuli* [Dr. Vines' italics]; this being so, it must be concluded that the movements are *the result of exciting causes existing within the organism itself*, and therefore the protoplasm is to be regarded as *automatic* [Dr. Vines' italics]—that is, as *giving rise* to the internal stimuli which cause the contraction of the cilia.

"Although there is no reason to believe that stimuli acting from without *cause* [Dr. Vines' italics] the movements of the zoospores, yet there is evidence to show that they may *modify* them. It has been found by various observers that the movements of the zoospores are affected by light; when exposed to light the zoospores arrange themselves so that their long axes are parallel to the incident ray, and they move either *towards* or *away from* the source of light according to circumstances. It is evident, therefore, that the protoplasm is *sensitive* to the action of this stimulus. This 'sensitiveness' to the action of external stimuli may be expressed in a general form by attributing to the protoplasm the 'fundamental property' of *irritability* [Dr. Vines' italics].

"The protoplasm of the zoospore is endowed, then, with the following fundamental properties in addition to those which have been already enumerated :—

5. It is *contractile* [Dr. Vines' italics], as evidenced by the movements of the cilia ;
6. It is *automatic* [Dr. Vines' italics], in that the exciting cause or stimulus which produces the contraction *originates in the organism itself* ;
7. It is *irritable* [Dr. Vines' italics], inasmuch as the movements of the organism may be modified by the action of external stimuli.

"These are, so far as can be ascertained, the 'fundamental properties' with which the protoplasm of the cells of plants may be endowed, and in virtue of which it performs the functions which together make up its life."

Page 8.—"Hæmatococcus and Saccharomyces are good examples of those lowly-organised plants in which the individual consists of a single cell ; and yet, simple as is their structure, they present a distinction of parts —in other words, they exhibit *differentiation* [Dr. Vines' italics].

". . . In ascending, then, from the lowest to the highest unicellular plants, we find that whereas in the simplest forms all parts of the cell appear to be equally concerned in all the functions of its life, in the higher forms there is a gradually increasing distinction of the functions and a localisation of them in certain parts of the cell ; in other words, there are indications of *differentiation of function*, and of *physiological 'division of labour'*" [Dr. Vines' italics].

It will be most interesting and instructive to place simultaneously before the reader the "fundamental properties" attributed to the animal cell by Dr. Foster, and the "fundamental properties" attributed to the vegetable cell by Dr. Vines.

The animal cell is—	The vegetable cell is—
"Contractile."	"Absorptive."
"Irritable."	"Metabolic."
"Automatic."	"Excretory."
"Secretory, or excretory."	"Reproductive."
"Digestive, etc."	"Contractile."
"Metabolic."	"Automatic."
"Reproductive."	"Irritable."

These lists of the "fundamental properties" of the animal cell and of the vegetable cell so exactly agree with each other as to render the conclusion that the animal and vegetable cells are practically identical unavoidable.

But a "fundamental property," or "capability," which most certainly belongs to the animal cell—or at any rate to some aggregation or segregation or combination or arrangement of animal cells—has not been mentioned by Dr. Foster, which is, that such cell or combination of cells is capable of being conscious.

If the vegetable cell possesses all *other* "fundamental properties" of the animal cell, is it likely that it will not possess that of being capable of being conscious also?

What further evidence can we discover of the fundamental identity of the animal and vegetable cell, and of the capability of consciousness in the latter as well as in the former?

CHAPTER IX.

FUNDAMENTAL OCCASIONS OF CONSCIOUSNESS.—DESIRES AND AVERSIONS.—HUNGER, SEX, ETC.

THE cause of all volitional, intentional, purposive action may, I think, be expressed in a single word—DESIRE.

Desire,—desire to have something which at the time of desiring the creature does not possess; or—the creature being in some "state" in which it does not like to be—desire to change that "state."

Without consciousness there can be no desire.

Emotional and psychological states may, broadly, be divided into two kinds: the state of pleasure and the state of pain. We "desire" the state of pleasure, we are averse to the state of pain. We desire to be *in* the state of pleasure, we desire *not* to be in the state of pain. If we happen to be in the state of pain, we desire the cessation of that state.

It will be convenient to speak of the occasions, causes, motives, of volitional action in all living beings, as "desires" and "aversions;" but it is to be understood that aversion is only a negative form of desire—desire to avoid pains, or if pain be present, desire to get free from it.

The reader will thus understand the sense in which I use the word "aversion"—viz., "desire" to avoid pain or to get rid of pain.

We may, then, consider the occasions, causes and motives of all voluntary actions to be—desires and aversions.

But to desire, a creature must be conscious. How is consciousness most likely to arise?

What is that state of consciousness which is capable of the highest possible intensity? I think we may safely reply that it is *the state of hunger*—thirst being included in hunger, thirst being hunger for some kind of liquid. To realise how intense may be the state we call hunger, we have but to think of some of the dreadful tales of the sufferings of those who, having been shipwrecked far from land, have, for the moment, saved their lives by taking to their boats, but with an insufficient supply of food and water. Hopeless of reaching any shore by any exertions of their own, their only chance of escape from death is their falling in with some passing vessel. As the days and nights slowly pass, and no friendly ship appears, and the only objects that meet their eyes are the pitiless sky, the boundless sea, and the dreadful spectacle of each other's faces, in which each one sees the deepening lines of hopeless famine and despair; for there begins to appear that horrible expression which intense hunger and thirst give to the human countenance. As the intolerable pains deepen, each reads in the face of his fellows the horrible thoughts which he himself cannot drive away, though their presence fills him with unutterable loathing. Some, unable longer to endure the momently increasing anguish of extreme famine, unable to seek a temporary relief by outraging the very name of humanity, with awful cries of madness and despair fling themselves into the ocean, perishing miserably; while some— But the picture is too terrible to be longer dwelt upon: it is sufficient that what has been written enables us to understand the intensity of feeling consequent upon extreme hunger. It is so, because *nutrition* is the *primary need.* Hence it is, that the state of hunger may be said to be that state which is most likely to be one of the first—in fact, *the* first cause of "consciousness."

There are two other primal occasions of consciousness—

sex, and an unfitting temperature ; but on these I need not, for the moment, dwell.

Taking it as indisputable that the primary need of living creatures is food, and that the want of food will be most likely to give rise to consciousness,—supposing the existence to be *capable* of consciousness,—it will be advisable to consider the ways in which plants procure, or become possessed of, food-materials.

The affirmation of plantal physiology is, that the plant-cell comes into possession of food-materials by a process of absorption described as *osmosis,* or *diffusion through a membrane*—the membrane being the cell-wall; and that, in the performance of that operation, consciousness on the part of the plant is not needed; for it is affirmed that the process of *absorption* or *osmosis* is purely a physical phenomenon.

If such be the fact, then to seek in that direction for any manifestations of consciousness would be futile. It is also asserted that if any seeming manifestations of consciousness *should* present themselves, it would be only a semblance of consciousness, not a reality; and would, upon examination, be resolvable into the action of chemical or mechanical causes, or of a mixture of them.

Before we can test the truth of these opinions, it will be necessary to acquaint ourselves with the histological or minute structure of a plant-cell.

Before we do so, it will be well to note that the principal function of the plant being that of preparing and storing up organised substances for the use of animals, it is clear that, the smaller the expenditure of energy by a plant in procuring food, the greater will be the amount of energy which can be applied to the manufacture and storage of organised substances required as food-materials by animals. If this function of plants can be adequately performed by them without any consciousness at all, we must not expect to find consciousness. If it cannot be performed without consciousness, we may expect to find that the *amount* of

consciousness will be the *smallest possible, consistent with the performance of the special function of the plant.*

The food-materials of plants are derived from the air, from the soil, and from water.

The great distinction of the organs for procuring food is that of *the Root,* which takes up mineral food-materials from the soil and from water; and *the Shoot,* which takes up gaseous materials from the atmosphere. We will principally consider the former ; our object being to discover—if we can—whether all plantal phenomena can be accounted for by the operation of chemical and physical causes alone ; or whether there are any of these phenomena which cannot be so accounted for, but *can* be accounted for if we suppose chemical and physical action to be consciously modified and directed by some power present in the cell which we call Life.

CHAPTER X.

THE VEGETABLE CELL, CELL-WALL, PROTOPLASM, NUCLEUS, VACUOLE, CELL-SAP, CHLOROPHYLL, MOVEMENTS, FOOD, METABOLISM.

WE have considered the fundamental properties of the vegetable cell. These properties we found to be identical in all respects with those of the animal cell, with perhaps —in the estimation of most, if not all persons—one exception: the vegetable does not possess the capability of being conscious.

Our present object is to endeavour to discover *whether any process or processes take place in the vegetable cell which cannot be accounted for, unless we suppose consciousness to be present.* In order to qualify ourselves to judge whether there be such, we will now consider the histological or minute structure of the vegetable cell.

At page 12 in his "Physiology of Plants," Dr. Vines writes concerning the structure and properties of the plant-cell:—

"We have learned that the cells of plants vary in their structure: the 'zoospores' of Hæmatococcus afforded examples of naked or primordial cells consisting simply of protoplasm; and Hæmatococcus and Saccharomycetes, of cells possessing a 'cell-wall.'

The Cell.

"Since living vegetable cells are, in the vast majority of cases, provided with a "cell-wall," our study of their structure and properties had better be made upon such as have this composition. For this purpose the cells of the cortical

parenchymatous tissue of the stem of some succulent plant may be conveniently taken. When a section of this tissue is examined with the microscope it is seen that—

The cells are separated by *cell-walls* ;

That in each cell there is a *layer of protoplasm which is in contact with the whole interior surface of the cell-wall;*

That either in this parietal layer or in a *central mass of protoplasm,—which is connected by protoplasmic strands* with the 'parietal layer,'—there is a well-defined, somewhat roundish granular body, the *nucleus;*

And finally, that the *protoplasm and the nucleus do not completely occupy the whole cavity* of the cell, but that there is a large space, *the vacuole*, which is filled with watery fluid, the *cell-sap*. Let us now study each of these parts in detail."

The Cell-Wall.

Page 14.—"The *wall* of a parenchymatous cell consists of a thin and apparently homogeneous membrane, which consists—principally at least—of a substance called cellulose.

"In the cell-wall, as in all organised structures—structures, that is, which have been formed by living organisms—a certain proportion of water is contained, holding small quantities of various substances in solution. The proportion of this water may be made to vary within certain limits without injury ; but if these limits be overstepped disintegration of the cell-wall is the result. The variation in the amount of water present produces a corresponding variation in the volume of the cell-wall ; hence the *absorption of water or 'imbibition'* by the cell-wall has come to be termed its 'swelling up' [or 'turgescence'].

"Cell-walls may increase both in extent of surface, and also in thickness."

Page 15.—" With regard to the first formation of the cell-wall, it is usually considered that the cellulose is *secreted by the protoplasm* in the form of a membrane over its whole surface."

The Protoplasm.

Page 23.—" The protoplasm of the cell under consideration forms a layer, termed the *primordial utricle*, which closely lines the cell-wall, and which is closely connected by means of bridles with a mass of protoplasm towards the middle of the cell, in which the *nucleus* is imbedded. Careful examination of the '*peripheral layer*' shows that it consists of *two* 'layers'—an *outer, hyaline and firm*, in close contact with the cell-wall,—an inner, *granular and somewhat fluid*; the former may be distinguished as *ectoplasm* [or outside-plasm], in contact with the cell-wall; the latter [in contact with the watery cell-sap] as the *endoplasm* [or inside-plasm]. The *granular* appearance of the *endoplasm* is due to the presence of minute solid particles of organic and inorganic substances, drops of oil, etc. [which have been manufactured by the power Life present in the protoplasm, out of the inorganic food-materials taken in through the cellulose wall], which may be distinguished from the protoplasm as *metaplasm* (Hanstein), and also to the presence of minute corpuscles termed *microsomata*, which are probably to be regarded as part of the protoplasm.

Page 24.—" As the cell increases in size, lacunæ [or clear spaces] are formed *in the protoplasm*, which coalesce to form the vacuole [which contains the cell-sap], and the protoplasm [which has had to stretch and thin itself, to keep in close contact with the cell-wall] constitutes *the primordial utricle* and the 'bridles' mentioned above. [The bridles are strands of protoplasm crossing in all directions the vacuole filled with the cell-sap, which holds in solution the substances which by the action of the Life-power present

in the protoplasm are to be converted first into new protoplasm,—which is afterwards converted into various other substances which are to form the food of animals. We are in the *primary workshop of Life.*] The reticulate structure has, at this stage, almost entirely disappeared; but it may be sometimes observed in the endoplasmic layer of the primordial utricle; the more delicate bridles appear to be quite homogeneous, whereas the stouter ones present a finely punctuated appearance.

"The general conception of the structure of protoplasm which observations enable us to form is this: that it consists of a reticulum of fine fibrillæ, enclosing a more fluid substance in its meshes; and that its consistency varies with the size of the meshes—that is, with the proportion of solid and fluid substance of which it is made up. It is probable that all actively living protoplasm possesses this structure.

"Protoplasm, like other organised bodies, is capable of swelling up.

Page 25.—"In addition to the protoplasm as described above, the cells of the higher plants commonly contain differentiated protoplasmic bodies, which may contain a colouring-matter or may be colourless; the former are termed *chlorophyll* (or *etiolin*) corpuscles, the latter *starch-forming corpuscles* or *amyloplasts.* Their structure and general chemical composition are probably the same as those of the protoplasm.

Page 26.—"The microsomata are minute particles, . . . evidently of a protoplasmic nature. . . They occur especially in the *endoplasm,* but occasionally in the *ectoplasm.* . . . *They play an important part in connexion with the formation of the cell-wall.* When a mass of protoplasm is about to surround itself with a cell-wall the *ectoplasm* becomes filled with microsomata. The microsomata coalesce laterally, and become altered into cellulose."

Here we have two primary steps in the Life-work. The

primary protoplasm converts parts of its substance into microsomata,—converts the microsomata into cellulose, of which the cell-wall is formed,—and we have the typical enclosed vegetable cell.

The Nucleus.

Page 26.—"The nucleus is a body of a somewhat oval form. Its outline is definitely marked, owing to its structure being *more firm* towards the periphery. [It is important to remember that *there is nothing of the nature of a 'wall.'*] In the interior of the nucleus there is a distinct rounded body, the *nucleolus*; it frequently happens that there are two or more nucleoli present. Besides this, the ground substance of the nucleus usually contains a number of *granules*; but in some cases it can be made out that it is *traversed in all directions* by trabecular [or bar-like] fibres, which form a reticular framework within it, the meshes of which are *larger towards the centre* and smaller towards the periphery.

Page 27.—". . . *A nucleus has now been found in almost all living cells.* . . . It is the general rule that in the process of cell-division [reproduction] the *division of the 'nucleus' precedes* that of the '*protoplasm*,'—and this, together with the fact that the granules in the protoplasm may frequently be seen to be arranged in lines *radiating from the nucleus*, would seem to indicate *that the nucleus is the centre of the molecular forces of the cell.* [It is to be specially noted also that *the nucleus is the last part of the cell which dies.*]

The conclusion respecting Forces, arrived at in Part I. of this work, was, that atoms consist of groups of powers, the activities of which are what we call forces; and that while forces are destructible, the "powers" of which the forces are the activities are indestructible—which "powers" were concluded to be gravity, chemical attractions, chemical repulsions, cohesity, elasticity, polaricity; that all the

phenomena of inorganic, or unorganised nature, are the results of the actions and interactions of these powers; that the existence of life could not be accounted for by such actions and interactions, for science has never been able to discover any instance of the coming into existence of life, except from some pre-existing life; that there is, therefore, no such thing as spontaneous generation; that there was a time when life could not exist on account of the intense heat. Consequently, as life does now exist, there must have been some Being to whom it owed its existence—some Being who created it—caused it to be, by an act of creational causation. *Life was therefore a new power added to the number already existing*, and all those events, states, actions, which we call the phenomena of "vitality," have been, and are, the results of the action of the power Life, in connection with the action of non-living atoms or groups of powers upon each other and upon life, and of life upon them.

One of the most remarkable of the abilities of the power Life is that of "efforting,"—an ability never present in non-living substances.

The power Life is able—within limits—to dominate, to override, to direct, the actions of the other powers; the results of the exercise of such ability being the total of the phenomena exhibited by living existences. And Life can "initiate" actions.

When Dr. Vines speaks of the "nucleus" as being the "centre" of the "molecular forces of the cell," I would venture to say that the nucleus is the special *locale* of the *life-power* of the cell, and that the life-power is, to a certain extent, able *consciously* to *use* the physical powers—"the molecular forces" of the cell, in certain ways, methods, manners, for the attainment of some *purposed* end. In the non-living world there are no "uses," no "purposes," no "ends." No actions which occur in the non-living world have any object, any purpose—so far as the actors are

concerned. A merely physical power does not *know* that it acts, and consequently, as it is not conscious, cannot either purpose or effort.

Does an individual vegetable cell ever "know" *what* it does, ever know *why* it does what it does?—that is to say, is it ever conscious?

To resume our consideration of the cell.

The Vacuole and the Cell-sap.

Page 28.—"In a very young cell the protoplasm and the nucleus fill the whole cavity, so that no vacuole is apparent."

A statement which seems to me to be somewhat misleading, because at the beginning of the existence of every cell there is no "cavity," only a naked mass of nucleated protoplasm.

"At an early period spaces [technically termed] 'lacunæ,' containing watery fluid [not *simply* water], make their appearance in the protoplasm; then, inasmuch as the growth of the peripheral portion of the protoplasm does not keep pace with that of the cell-wall, and inasmuch as the peripheral portion of the protoplasm *always remains in direct contact with the cell-wall* [a fact to be carefully remembered], these 'lacunæ' become larger, and *fuse* so as to form one continuous vacuole [or cavity], which is traversed here and there by bands of protoplasm which connect the peripheral layer (the primordial utricle) with a more or less centrally placed mass [containing the nucleus]. It occurs not uncommonly, that ultimately the whole of the protoplasm is required to form the primordial utricle, and in such a case the 'nucleus' is parietal." [That is, *it becomes located in the protoplasm of the primordial utricle.* The nucleus is the first part of the cell, and it is the last part to die.]

"The 'cell-sap,' the watery fluid which saturates the protoplasm and the cell-wall, and occupies the vacuole, consists of water *holding in solution* a number of both organic and inorganic substances,—which have either been

formed and *thrown off* by *the protoplasm*, or have *yet* to be absorbed and elaborated by it."

We have now to consider the *motions* which occur in the interior of the cell. The most striking of these are what are termed the "*streaming*" *movements* of the protoplasm of the cell, which is commonly designated by the terms *Circulation* and *Rotation*. At page 521 Dr. Vines writes :—

"This 'streaming' movement of protoplasm is made apparent by the granules of foreign substances which are carried along on the current. When the protoplasm is not confined to the peripheral layer (primordial utricle), and there is a more or less central mass of protoplasm *investing* the 'nucleus,' connected by delicate threads—varying from time to time in position and number—with the primordial utricle, the 'streaming' movement can be detected, not merely in the *peripheral layer*, but in *the strands in various directions*, and is termed '*Circulation*.' When the protoplasm constitutes only a 'primordial utricle' [*which contains the nucleus*] the 'streaming movement' follows the contour of the cell, *down* one side, *across* the end, *up* the other side, etc. This is what is termed '*Rotation*.' It is not, however, the *whole* primordial utricle which moves, but an *internal layer only*, consisting of relatively fluid protoplasm; the *external layer*, in which the 'chlorophyll corpuscles' are embedded, *remains stationary*. This moving layer constitutes a *hollow cylinder*, each half of which is moving in the *opposite direction* to the other."

Pulsating Vacuoles.

Page 522.—"The last kind of movement to be considered under this head is that of 'pulsating vacuoles.' These are small, more or less nearly spherical cavities, which make their appearance in the protoplasm, and then suddenly disappear. In the course of their relatively slow expansion (diastole) *they become filled with cell-sap*, which is *forced out* on the sudden contraction (systole).

"Nothing is certainly known as to the physiological significance of the 'pulsating vacuoles.'"

Having learnt something of the fundamental properties of the plantal cell, something of its composition and of its activities, let us now, by the application of all the intellect, the patience, the imagination, the power of labour we possess, endeavour to attain to some understanding, not only of what takes place within the cell, but also to some understanding of how it takes place; and, above all, why it takes place.

The "why" of what takes place is not, in one sense, difficult to discover. It is that the vegetable kingdom may supply food-materials for the support of the animal kingdom. But the why of that why—that is, why the vegetable kingdom should expend the greatest part of its energies in the production of food for the animal kingdom—is a much more difficult question to answer. Nevertheless, it is a question to which we shall hereafter have to endeavour to give some answer. In the meantime, let us study the "how" of the matter.

And, first, what are the substances upon which the cell works?—that is, what are the food-materials of the cell?

At page 48 of his article in the *Encyclopædia Britannica* on "Vegetable Physiology," Dr. Vines writes:—

"The elements of the food of plants may be conveniently classified into two groups; the first, consisting of those which enter into the *composition* of organised plant-substance; the second, consisting of those which without entering into the *structure* of the plant, are essential to the proper performance of the metabolic process. To the first group belong the elements carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus; to the second, potassium, calcium, magnesium, iron, chlorine, sodium, silicon."

The sum of the actions by means of which the plant-cell effects the transformation of its gaseous and mineral food—

first into protoplasm and afterwards into vegetable substances—is called the metabolism of the plant.

Such "metabolism" is of two kinds: *constructive* and *destructive.*

At page 13 of his article on "Physiology" in the *Encyclopædia Britannica,* Professor Foster thus describes "metabolism":—

"These facts, and other considerations which might be brought forward, lead to the tentative conception of protoplasm being a substance (if we may use the word in a somewhat loose sense) not only unstable in nature, but subject to incessant change. We may picture this total change, which we denote by the term "*metabolism,*" as consisting on the one hand of *a downward series of changes* (*katabolic* changes), a stair of many steps, in which more complex bodies are broken down with the setting free of energy into simpler and simpler waste bodies; and on the other hand *of an upward series of changes* (*anabolic* changes), also a stair of many steps, by which the dead food, of varying simplicity or complexity, is, with the further assumption of energy, *built up into more and more complex bodies. The summit of this double stair we call protoplasm.* Whether we have a right to speak of it as a single body, in the chemical sense of that word, or as a mixture in some way of several bodies—whether we should regard it as the very *summit* of the double stair, or as embracing as well *the topmost steps on either side*—we cannot at present tell. Even if there be a single substance forming the "summit," its existence is absolutely temporary; at one instant it is made, at the next it is unmade. Matter which is passing through the phase of life rolls up the ascending steps to the top, and forthwith rolls down on the other side. But to this point we shall return later on. Further, the dead food itself, fairly, but far from wholly, stable in character, *becomes more and more unstable as it rises into the more complex living material.* It becomes more and more explosive, and

when it reaches the *summit* its equilibrium is overthrown, and it actually explodes. The whole downward stair of events seems, in fact, to be a series of explosions, by means of which the energy latent in the dead food, and augmented by the touches through which the dead food becomes the living protoplasm, is set free."

The "touches" are the action of the power Life.

"Some of this freed energy is used up again within the material itself, in order to carry on the same *vivification of the dead food*; the rest leaves the body as heat or motion."

A sufficiently wonderful substance, and producing by its action the same results alike in animal and in plant: a coincidence not to be wondered at, seeing that our examination of the animal cell and of the plant cell has shown that their fundamental properties are identical.

We have now inquired into the nature and fundamental properties of the plant-cell, its histological or minute structure, its motions, and the phenomena exhibited during the processes of metabolism, or the transformation of its mineral and gaseous food into protoplasm and other organised substances.

The simplest formula describing evolution is, that it arises out of the struggle for existence, the consequence of such struggle being the survival of the fittest. What is that struggle for existence but, primarily, the struggle for food? In our inquiry as to whether the plant-cell ever becomes conscious, what is the most likely direction in which to look for a solution of that problem? Now considering that the need for food is universal and continuous, and that in existences capable of being conscious that "capability" is most likely to be brought into operation by the need for food, especially if such need be extreme—*we will consider how plant-cells obtain their food*, and whether their modes of obtaining their food present any phenomena which can be accounted for only by the presence of consciousness.

CHAPTER XI.

CAN SELECTION OF FOOD-MATERIALS BY PLANTS BE ACCOUNTED FOR WITHOUT CONSCIOUSNESS?

RESPECTING the mode in which the plant-cell obtains its mineral and gaseous food-materials, Dr. Vines, in his article in the *Encyclopædia Britannica* on "Vegetable Physiology," writes (p. 44):—

"*Absorption of water and substances in solution.*—The bodies of plants, unlike those of the great majority of animals, do not contain any internal cavity into which the food may be taken as a preliminary to its being absorbed by the tissues. The materials of the food of plants are therefore *taken up directly from without into the cells of the absorbent organs.* The cells which are especially concerned in absorption are—in the higher sub-aerial plants—the *root-hairs*, thin-walled, unicellular, unbranched filaments, which are developed from the epidermal cells some way behind the growing point of the root; in the lower plants, and even in those of the higher plants which lie submerged, all the cells of the plant may take part in absorption. Since the food is *directly* absorbed by the cells, and since the cells all possess a cell-wall [cells are at first without a wall, the cell-wall is the result of the first formative action of the vital and physical powers present in the cell], the materials of the food must be taken up in solution. Salts and other substances are taken up by the absorbent cells in the form of watery solutions. Substances which are soluble in water are dissolved in the water—which is present

in a greater or smaller proportion in all soils—and of those which are not soluble in water, many are *brought into solution* by the *acid sap* which saturates the walls of the root-hairs.

"*The actual process of absorption is an instance of diffusion through a membrane*—that is, of '*osmosis*.'

"*Only such substances can be absorbed by the root-hair* as are present in *larger proportions* in the *water to be absorbed* than they are in the *cell-sap of the root-hair*; this *inequality* between the proportion of any substance in solution in the liquid on the one side, and in that of a membrane on the other, *is a necessary condition of osmosis*. Hence, in order that the absorption of any particular substance by the root-hairs may be continuous, it is necessary that the substance in question should not accumulate in the cell-sap; this accumulation is prevented either by the *actual consumption* (*i.e.* chemical decomposition) of the substance in the cell, *or by the withdrawal of it to supply the needs of adjacent cells*. In fact, so far as the process of 'absorption' is concerned, the cell-sap of the *internal cells* of the root stands in the same relation to the cell-sap of the root-hairs as the cell-sap of the root-hairs does to the external liquid; and as this relation exists between the *successive internal layers* of cells, there is set up a *current of absorbed substances which travels* from *the surface* towards *the centre*.

Page 45.—"As a matter of fact it has been ascertained that when different salts or other substances are presented to the roots of a plant they are '*absorbed*' *in different quantities*. And further, it has been ascertained that the different salts are absorbed in *different proportions* by the roots of *different plants*; it is, in fact, upon this that the necessity for the 'rotation of crops' depends. A striking illustration of this is afforded by a comparison of the amount of silica present in the ash of equal dry weights of 'gramineous' and 'leguminous' plants. According to Wolff—

"100 parts	meadow hay	contain	27·01	per cent.	of silica.
" "	wheat-straw	"	67·50	"	"
" "	red clover	"	2·57	"	"
" "	pea-straw	"	6·83	"	"

"The absorption of salts in certain proportions by a plant is the expression of what may be conveniently termed its '*specific absorbent capacity*.' *It must not be supposed that this term suggests that the roots possess any 'selective' power* by which *they can absorb this salt and reject that one, or by which this one is absorbed in 'larger quantities' than that one.* The question as to whether or not a particular substance will be absorbed is a *purely physical* one, dependent upon the relation between the 'molecules' of the substance and the 'cell-wall' and 'primordial utricle' which they have to traverse, and in no degree dependent upon the usefulness or hurtfulness of the substance to the plant. The amount absorbed of any particular substance depends ultimately upon the activity with which the plant chemically alters the substance after absorption. To return to the illustration just given. The great difference between the amounts of silica present in the ash of gramineous and of leguminous plants respectively is the expression of the fact that the former (the hay and the wheat-straw) are capable of *withdrawing* relatively large quantities of 'absorbed' silica from the sphere of 'osmotic activity,' and depositing it in the insoluble form, in the tissues; whereas the latter (the clover and pea-straw) can only do so to a comparatively small extent. The 'specific absorbent capacity' of a plant is simply a manifestation of its 'specific metabolic properties.'"

If the cell possess no "selective" power; if osmosis or diffusion through a membrane be sufficient to account for the passage, not only of substances, but of *proper food-substances*, from the outside of the cell into its interior—of course there is no need to suppose the presence of consciousness—or, indeed, even of life, in the cell; and

if consciousness is to be found at all in the cell, we must look elsewhere for its manifestations.

But are we quite sure that the statement that the process described is a "purely physical" one, is correct? Let us acquaint ourselves with the exact meaning of the words "osmosis," "absorption."

In the first part of this work I have considered the word "absorb" in relation to the passage of heat into bodies. The general—if not universal—belief is, that the heat present in any body (leaving out heat which has been *generated* by the body or bodies, as in chemical union) has been "absorbed" by that body. I hope I have shown that such is not the case; that the body does not "absorb" or "suck in" the heat, but that the heat forcibly penetrates the body. Now, does the cell absorb—that is, suck in, draw in—the water? or does the water force its way into the cell? *If the cell be passive*, then the water is the active factor, and has penetrated, forced its way into the cell; *but if the water be passive*, then the cell is the active factor, and has drawn in, sucked in, "absorbed" the water.

In Ogilvie's "Imperial Dictionary" "osmose" is thus defined: "*Osmose* (os'mōs) *n.* [Gr. *ōsmos*, an impulse, a pushing, from *ōtheo*, to push], the impulse or tendency of fluids to pass through porous partitions and mix or become diffused through each other: the phenomena attending the passage of fluids, whether liquids or gases, through a porous septum. It includes *endosmose*, or the tendency of a fluid to pass into another, and *exosmose*, or the tendency of a fluid outward. When two saline solutions, differing in strength and composition, are separated by a porous diaphragm or septum of bladder, parchment, paper, or porous earthenware, they mutually pass through and mix with each other; but *they pass with unequal rapidities*, so that, after a time, the height of the liquid on each side is different."

The "septum or separating bladder, parchment, paper, or

porous earthenware" may be compared with the cell-wall of non-living cellulose; but the living, moving, nucleus-containing protoplasmic primordial utricle—can we compare *it* with the dead "bladder, parchment, paper, porous earthenware" of the septum dividing the saline solutions which pass with unequal rapidities into each other?

That we may be able clearly to realise the difference between any action that may take place in the non-living cell-wall, and such action as we *know* takes place in the living, nucleus-containing, protoplasm of the primordial utricle, I will give Mr. Huxley's account of the action which takes place in the protoplasmic lining of a stinging hair of the common nettle. At p. 123, "Lay Sermons," Mr. Huxley writes:—

"You are doubtless aware that the common stinging nettle owes its stinging property to the innumerable stiff and needle-like, though exquisitely delicate, hairs which cover its surface. Each stinging-needle tapers from a broad base to a slender summit, which, though rounded at the end, is of such microscopic fineness that it readily penetrates and breaks off in the skin. The whole hair consists of a very delicate outer case of wood, closely applied to the inner surface of which is a layer of semi-fluid matter, full of innumerable granules of extreme minuteness. This semi-fluid lining is protoplasm, which thus constitutes a kind of bag full of *limpid fluid*, and roughly corresponding in form with the interior of the hair which it fills. When viewed with a sufficiently high magnifying power, *the protoplasmic layer* of the nettle hair *is seen to be in a condition of unceasing activity*. Local contractions of the whole thickness of its substance pass slowly and gradually from point to point, and give rise to the appearance of progressive waves, just as the bending of successive stalks of corn by a breeze produces the apparent billows of a cornfield.

"But in addition to these movements, and independently

of them, the 'granules' are 'driven' in relatively rapid streams, through channels in the protoplasm which seem to have a considerable amount of persistence. Most commonly the currents in adjacent parts of the protoplasm take similar directions; and thus there is a general stream up one side of the hair and down the other. But this does not prevent the existence of partial currents which take different routes; and sometimes trains of 'granules' may be seen coursing swiftly in *opposite* directions, within a twenty-thousandth part of an inch of one another; while, occasionally, opposite streams come into *direct collision*, and, after a longer or shorter struggle, one predominates. The cause of these currents seems to be in contractions of the protoplasm which bounds the channels in which they flow, but which are so minute that the best microscopes show only their *effects*, and *not themselves*.

"The spectacle afforded by the wonderful energies imprisoned within the compass of the microscopic hair of a plant, which we commonly regard as a *passive* organism, is not easily forgotten by one who has watched its display, continued hour after hour, without pause or sign of weakening."

I do not know what conclusion may be drawn by the reader in relation to the doctrine of osmosis or diffusion through a membrane as expressing—and expressing *completely*—the mode in which the water containing the mineral food of the plant-cell passes into the cavity containing the cell-sap; but for my own part I find it impossible to admit that the living, moving protoplasm, constituting the primordial utricle, can, in any proper sense of the word, be considered a mere passive membrane.

I have quoted Dr. Vines' account of the peripheral layer or primordial utricle, where he says:—

"Careful examination of the peripheral layer shows that it consists of *two layers*—an *outer, hyaline and firm, in close contact with the cell-wall*, an *inner, granular and somewhat*

fluid; the former may be distinguished as the *ectoplasm*, the latter as the *endoplasm*. Very commonly the '*endoplasm*' is bounded *towards the vacuole by a hyaline and firm layer resembling* the 'ectoplasm' which bounds it towards the 'cell-wall.'"

Let us see what the water on the outside of the cell-wall has to get through before it reaches the interior—the vacuole, or cavity, containing the cell-sap.

First there is the non-living cell-wall consisting of cellulose. Having got so far it comes in contact with the first part of the protoplasmic layer of the utricle. It has then to get through the "firm hyaline layer of the ectosarc," which is not in motion. Then it has to get through "streaming," "circulating," "rotating," working, manufacturing, continually changing protoplasm. Then it has *finally to pass through the "firm, hyaline layer of the 'endosarc,'"* from whence it emerges into the vacuole.

We may say that, first, there is a distinct physical membrane, the cell-wall; then a motionless firm hyaline layer of protoplasm; then a layer of living, moving protoplasm, in which the processes of metabolism are in full operation, and *in which the "nucleus," the heart-seat of life, is present*; then it has to pass through the inner firm hyaline layer of the endosarc to find itself in contact with the cell-sap.

The only part of this series of passages of the water which can reasonably be described as "osmosis or diffusion through a membrane" is the passage through the cell-wall; but as it seems to me, osmosis will not account for the passage through the layers of protoplasm beyond the cell-wall. Indeed, Dr. Vines himself says:—

"Diffusion through the cell-wall can take place only on condition that the substance diffused is of such a nature, chemically and physically, that the nature of the cellulose composing the cell-wall offers no chemical or physical resistance to the passage of such substance."

At page 87 of his "Physiology of Plants," Dr. Sachs writes :—

"The substance (cellulose) is remarkable for its great *resistance* to the most various chemical solvent reagents, and its extraordinary solidity and elasticity are of special importance to the plant."

At page, 39 Dr. Vines writes :—

"It has already been pointed out in the case of yeast that the cell is *capable of absorbing water containing various substances in solution,* and, now that we have learned something as to the structure of the cell, we are in a position to study this process in detail."

Page 40.—" . . . We learn that the cell is capable of absorbing water in such a quantity as to cause considerable stretching of the cell-wall and the primordial utricle—that is, to set up a considerable hydrostatic pressure in the cell. This state of 'tension' between the hydrostatic pressure on the one hand and the elasticity of the cell-wall on the other, is designated as turgidity."

But protoplasm is not a fluid. At page 37, Dr. Vines writes :—

"Of all organised bodies protoplasm is the one which most nearly approaches a fluid, as is shown by the fact that it tends to assume a spherical form when in a state of equilibrium. But it is nevertheless *not a fluid* : it is a *semi-fluid.* We may define such a body—as Pfaundler has done—by saying, that it consists of an intermixture of groups of solid and fluid molecules. Assuming Strasburger's theory of organised bodies, we must regard the molecular structure of protoplasm as capable of undergoing constant modification, the grouping of the molecules being in a state of perpetual change ; the result of this molecular activity being the phenomena which we term vital, and which distinguish protoplasm as *living* from all other organised bodies."

When Dr. Foster describes the "double stair of many

steps," during the ascent of which the non-living materials present in the cell are undergoing the changes which result in their transformation at the top of the steps into protoplasm, he seems to me to touch on a series of very extraordinary circumstances unnoted in physiology as extraordinary. It is clear that before the simple stable substances can be transformed into the extremely complex and unstable protoplasm *they must first be more or less decomposed*, even if they are not entirely decomposed *into their ultimate atomic elements*, and afterwards undergo a process of most complex re-composition till such re-composition culminates in protoplasm. That change is certainly not effected by the materials themselves, we can attribute it only to the power Life, for until Life appeared there was no such substance as protoplasm in existence. None of those organised substances, which are the result of the organising power Life, existed.

Respecting the complexity of carbon compounds—which are amongst the most remarkable of the organised substances produced by the action of the power Life, Sir Henry Roscoe, at p. 243 of his "Elementary Chemistry," writes :—

"The first striking peculiarity which the carbon compounds exhibit is their extraordinary number; those already known far exceeding all the compounds of the other elements taken together, and new ones are being daily brought to light. A second peculiarity of these compounds is, they are almost all of them formed by the union of *carbon* in different proportions, with one or more of three other elements—viz., *hydrogen*, *oxygen*, and *nitrogen*; whilst the *number of atoms* of these elements contained in the *molecule* of many organic bodies is extremely large; thus sugar contains forty-five and stearine no less than one hundred and seventy-three atoms of their constituent elements."

When we speak of protoplasm as living, it is not the mere particular combinations of certain atoms which cause Life, but Life which causes the particular combinations of certain

atoms. It has been strenuously asserted that because we never find Life without, or apart from, protoplasm, Life is merely a "property" of protoplasm. Such reasoning is wholly invalid. It is quite true we never find "Life" *apart from protoplasm*; but it is also true that we *do* find "protoplasm" *apart from Life*. If Life were merely a "property" of protoplasm, then, wherever there was protoplasm, there would be life. If we find protoplasm without life—dead—then Life cannot be a "property" of protoplasm. Protoplasm, whether living or dead, is a compound of elemental atoms. We already are able to make a great many of these compounds, and there is no reason—except that of not knowing how to do it—why we should not make many more; and if we could acquire the requisite knowledge, there is no reason why we should not make protoplasm itself. The great difficulty is its extreme complexity. We can suppose the difficulties overcome, and a speck of manufactured protoplasm lying before us; but we should be no nearer the production of *Life* than before, for the protoplasm would not be living, but dead. No instance has ever yet been known of the production of living protoplasm from anything but previously existing living protoplasm—that is, protoplasm *containing* Life.

The production by the chemist of butyrate of dimethylamin has been adduced as a sufficiently typical compound. But, says one of the greatest, if not the greatest of living microscopists (Dr. Dallinger)—contrasting the method of Nature with the method of the chemist—"to obtain it the chemist has to employ no less than twenty distinct chemical and physical processes, involving many varying temperatures, *from a red heat to the intensity of the electric arc*, and between *thirty and forty reagents and their products* are employed in the process. Compare this with the silent and impenetrable simplicity of the chemistry of Life, and vivid and striking is the contrast. And yet, when the product of the chemist lies before you, produced by the tremendous

relative labours of the laboratory, it is as far off from the dead white of egg, to say nothing of living protoplasm, as the qualities of a flint pebble are from the qualities of the diamond.

"The facts of nature—surely our safest guide—declare that the transition from not-life to life is abrupt. The break is absolute and clear."

At page 40, Dr. Vines writes:—

"The diffusion of liquids through membranes is termed *osmosis*; and we may now inquire into the conditions of its accomplishment. They are briefly these: when two different liquids are separated by a membrane, which they are both capable of wetting, currents are set up between the two liquids which traverse the membrane. Thus, when an ordinary osmometer (the membrane of which consists of a piece of ox-bladder with the muscular coats removed), containing a liquid, is placed in a vessel containing another liquid, currents pass through the membrane *into* and *out of* the osmometer, the former being termed the *endosmotic*, the latter the *exosmotic* current. The quantity of the liquids conveyed in each of these directions may be the same or may differ very considerably, and the chemical nature of the liquids is of great importance in the process."

Page 41.—"The absorption of water by the cell is doubtless subject to the same conditions as those which determine the osmosis in the osmometer, the cell-sap corresponding to the fluid contained in the osmometer. The question now arises as to *the determination of the osmotically active substance*. It must be borne in mind that the concentration of the cell-sap is slight, its specific gravity being but little higher than that of distilled water; the osmotically active substances which it contains must therefore possess a strong affinity for water."

Or there must be *that* in the cell which needs and desires not only the water, but also certain substances contained in

the water, and whose activity is the cause of its entrance into the cell.

"That *sugar* [present in the cell-sap] is not the substance which is active in the process is evident; for, inasmuch as its affinity for water is comparatively slight, a much larger quantity of it would have to be present than can be inferred from the concentration of the cell-sap, in order to account for the amount of water absorbed. This objection applies also to the *other organic substances* present, which have only a *slight affinity* for water. The *mineral salts* in the cell-sap have a much greater affinity for water than sugar has, and they are doubtless active. [An assumption, but an assumption not very confidently made.] It must be remembered, however, that these salts are not produced *in the cell*, but are *absorbed from without* [and being, therefore, already in the water before the water enters the cell, must have had their affinities for water already satisfied, and therefore have no reason for going, as one may say, first through the cell-wall and then through the protoplasmic substance of the primordial utricle to satisfy affinities, which are already satisfied], hence there is a limit to their osmotic activity. The osmotically active substances which we seek must be such as have a great affinity for water, and are *constantly being produced in the metabolism of the cell.* De Vries has pointed out that the organic acids and acid salts fulfil these requirements. They are present in all living cells which are capable of becoming turgid, their formation is doubtless a necessary part of the metabolism of the cell, and their affinity for water is considerable."

Sugar is not accepted as the agent of absorption, neither are mineral salts, because the latter are absorbed *from* the water itself, and "organic acids" and acid salts have to be *manufactured* by the power in the cell before they can absorb water at all, and we still have to ask how the water containing the mineral substances has got into the cell.

What is the meaning of "hunger"? It simply means a desire for some particular kind of action or actions. If I am "hungry," it means that certain somethings—cells, in fact—are present in my body which require some appropriate substances on which to exercise themselves. That they may be able to do so, I have to provide them with certain appropriate substances. If I do not do so, they become importunate. If I continue to neglect to supply what they need, they become painfully importunate. (I suppose the reader sees that if one cell be capable of consciousness, *every* cell must be capable of consciousness.) If I continue during a long period to fail to supply their needs, they become agonisingly importunate, and only cease their craving with death.

At present we are dealing with a single cell. When the cell—that is, the living nucleus of the cell—becomes hungry, needs something on which to expend its forces, and that something is in contact with its cell-wall—it begins to act. It draws in the water with its contained mineral substances, and draws, draws, draws till it can hold no more—in a word, it becomes "turgid," and rests. Then commences the work of metabolism, *the conversion of the food-substances into organised substances.* When that is effected and there has followed a certain period of rest, the process of imbibition recommences, and we have what is termed the "periodicity" of growth, which in reality means the fulfilment of a cycle consisting of absorption or taking in of water and mineral substances by the roots, and of carbon, etc., by the leaves, and their subsequent conversion, first into protoplasm, and then into the various tissues of the plant, whether it be an alga or an oak, and then a period of rest. *What* shall be absorbed depends first upon the cell-wall; after that upon the protoplasm of the utricle and the nucleus.

At page 41 Dr. Vines writes:—

"Assuming, then, that the organic acids and acid salts are

the substances which bring about the absorption of water by the cell, we may go on to inquire into *the conditions on which the turgidity or swelling up depends.* A closed bladder containing syrup will soon become 'turgid' when immersed in a vessel of water: can we then compare a turgid 'cell' to a turgid 'bladder,' the cell-sap to the syrup? The answer to the question is, that such a comparison is inaccurate, for it has been found that the *cell-wall* is not able, like the membrane of the *bladder*, to hinder the *escape* by *exosmosis* of the contained liquid to such an extent as to become 'turgid.' *It is the 'living layer' of protoplasm, the 'primordial utricle,'* as we have termed it, which offers the necessary resistance and prevents the escape of liquid by exosmosis; it is to *this* that the 'turgidity' of the cell is to be ascribed. We can now compare the turgid cell to the turgid bladder: the cell-wall and the primordial utricle *together* correspond to the membrane of the bladder, the cell-wall supplying the necessary elasticity, the primordial utricle the necessary resistance to exosmosis."

In discussing the absorption of substances in solution by the cells Dr. Vines writes (page 43):—

"*The matter of primary importance is the passage of substances through the primordial utricle.* We shall see that of the many substances which *readily* pass through the *cell-wall, some cannot traverse the primordial utricle at all,* and others only in small quantity; and the *conclusion* that we shall arrive at will be, *that it is the primordial utricle which determines what substances and what quantity of them shall enter the cell.*"

Consciously or Unconsciously?

Dr. Vines gives an instance of nitric solution which readily passes through the cell-wall but cannot pass through the utricle.

Page 44.—"But we must bear in mind that we have here [in the primordial utricle] a *living* and not a *dead*

membrane to deal with, and consider that the laws which regulate osmosis through the latter may be, and probably are, *profoundly modified* in the former by the *vital forces* which are active in it."

Does the vital power, the life, act consciously? Let us hear what Professor Foster says respecting "osmosis," or "diffusion through a membrane."

Speaking of the great force-pump of the vascular system—the heart, and of the general action of the blood, Professor M. Foster says (*Encyc. Brit.* "Physiology," page 16) :—

"Hence the blood becomes, as it were, a chemical epitome of the body: *from it* each tissue takes something away; *to it* each tissue gives something back. As it sweeps by each tissue, losing and gaining, it makes the whole body common, and, when working aright it brings it about that each tissue is never in lack of the things which it wants, never choked with things with which it has done.

". . . The gross phenomena of the flow of blood through the capillary channels may be interpreted on simple 'hydraulic' principles; but *no appeal* to the ordinary *physical laws of dead material will explain* the phenomena of the *interchange* between the blood on the inside of a capillary wall and the tissue-elements on the outside. In every tissue, be it gland, muscle, or nerve, *the 'blood,' so far from being actually in contact with the active protoplasmic units of the tissue, is separated by the protoplasmic film of the capillary wall, and by a space or spaces, greater or smaller, filled with the fluid called lymph, and lined to a greater or less extent with protoplasmic cells, which lining, often at least, parts the tissue-units from the lymph.* Hence the tissue lives upon the 'lymph,' while the lymph is replenished from the 'blood;' and the interchange between the tissue-unit and the lymph is determined, not only by direct action of the tissue-unit on the lymph, but also by the relations of the lymph to the blood, as regulated by the

capillary wall and the cellular lining of the lymph spaces. *We may speak of the interchange as broadly one of diffusion or osmosis through filmy membranes: but diffusion is not the lord of the matter; it is rather a humble servant 'directed' hither and thither by occult molecular processes in the protoplasmic structures concerned.*"

And I think we may add that these "occult molecular" processes are "directed" by the power Life, by the "desires" of the cells.

Referring to the physiology of the kidney, Professor Foster writes (page 17):—

"But there are other problems connected with the physiology of the kidney. The kidney is, broadly speaking, *constructed of living protoplasmic cells* so arranged that *each cell is, on one side, bathed with blood and lymph, and on the other* forms the boundary of a narrow canal, which, joining with other canals, ultimately opens into the urinary bladder. Here the question arises *how it is* that these protoplasmic cells, having nothing to draw upon but *the common blood*,—which is distributed to other tissues as well,—are able to discharge, on the other side of them into the canal, the fluid urine, which is *absolutely distinct from blood, which contains substances wholly uuknown in blood*, as well as substances, which, though occurring in blood, are found there *in minute quantities only*; and, moreover, are not found to escape from the blood *into any other tissues or organs.* In attempting to answer this question we come upon an inquiry of quite a different nature from the preceding,—an inquiry for the solution of which *mechanical suggestions are useless.* We have to deal here with *the molecular actions of the protoplasmic cell.* We must seek for molecular explanations of the questions—*why* a current sets *across* the cells from blood-capillary and lymph-space to the hollow canal; *why* the substances which emerge on the *far side* are *so wholly unlike* those which enter in on the *near side*; *why*, moreover, the *intensity* of this current

may wax and wane—now flooding the canal with urine, now nearly or quite drying up; *why* not only the *intensity* of the current, but also the absolute and relative *amount* of the chemical substances carried along it *are determined by events taking place in the cell itself*, being largely independent of both the quantity and quality of the blood which forms the cell's only source of supply? These and other like questions can only be solved by looking with the 'mind's eye,' by penetrating, through careful inferences, into those inner changes which we call 'molecular,' and which no optical aid will ever reveal to the physical eye."

In relation to "assimilation" and "nutrition," page 18:—

"In the reception or absorption of the digested food, we similarly find the *purely physical processes of diffusion and the like overridden by the special protoplasmic activities of the constituent cells of the lining of the canal.* . . . Lastly, the blood—however well prepared, however skilfully driven to the tissues by the well-timed activity of the vascular system—even when it has reached the inner network of the tissue-elements, is not, as yet, the *tissue itself*. To *become* the tissue it *must undergo molecular changes of the profoundest kind; it must cross the boundary from dead material to living stuff*. The ultimate problems of nutrition are of the molecular kind. All the machinery, however elaborate, is *preparatory only, and it is the last step which costs the most*."

The motions of molecules are consequent upon the action of their own inherent powers, or they are consequent upon the action upon them of some external power. It is evident that physico-chemical powers alone cannot give a satisfactory answer to the questions propounded by Professor Foster, for "the purely physical processes of diffusion and the like are *overridden* by the special protoplasmic activities of the constituent cells of the lining of the canal,"—that is, by the Power Life which *determines* the events taking place within the cell. I think such "determinations" cannot be

accounted for, except by the conscious action of the cell. But Professor Foster shall himself speak for me. At page 20 he writes :—

"The doctrine of Evolution compels us to admit that consciousness must be *potentially* present in the simple protoplasm of the amœba, and must be similarly present in *all* the tissues of the highly developed animal, instead of being confined to some *limited* portion of the nervous system. Evolution refuses to admit a sharp line of demarcation between a conscious and a non-conscious part; and this decision is increasingly supported as our knowledge of the nervous system advances."

These are great words in favour of consciousness in the cell.

I venture to think that consciousness is not only "potentially," but, *on occasion*, "actually" present in *every* cell, and that without such universal consciousness what are called vital phenomena are inexplicable. *Osmosis* or *diffusion* is not the "*lord* of the matter; it is rather a *humble servant directed* hither and thither by occult molecular processes in the protoplasmic structures concerned;" such molecular processes being governed and, may we not say? *consciously directed by the power Life* in each cell. The blood in its progress through the body is brought—under the conditions set forth by Professor Foster—within reach of each cell of the widely differing tissues of the body. For in that rushing stream are present the different kinds of nutritive matters needed by each cell; but *each cell* has out of that stream *to select for itself such substances as it needs*. "Osmosis," without such "selection," is insufficient to account for the events which occur; *supplemented* by that "selection," each cell takes what it needs, and we can understand *how* the phenomena occur. Is it possible to believe that such "selection" can be effected without "consciousness"?

CHAPTER XII.

TAKING IN OF FOOD, ABSORPTION, OSMOSIS, CANNOT ACCOUNT FOR ALL THE PHENOMENA.

THE special organs by which a plant obtains water holding in solution substances upon which it feeds are its roots. These functions can best be studied as they present themselves in the roots of land plants. We shall therefore direct our attention to what may be described as the action of typical roots of land plants as they are set forth by Dr. Sachs in his "Physiology of Plants;" Dr. Sachs being one of the highest, if not the highest authority on the subject. The edition from which I shall quote is the latest—that of 1887, translated by Professor H. Marshal Ward, M.A., F.L.S. At page 11, Dr. Sachs writes, concerning "the root:"—

"The primary and essential character of the root consists in that it becomes, first of all, developed as an organ of attachment on or in a substratum; and when the latter is the case, it is at the same time the medium of absorption of nutritive matters contained in the substratum.

"In vascular plants with upright main stems, as the sunflower and others, we meet with a root system developed completely in the earth, and composed of long, cylindrical fibres of varying thickness, which is in ordinary language simply termed the root; in scientific language it is, however, more to the purpose *to call each one of these fibres a 'root.'*"

Page 14.—"If we now examine a single root-fibre closely, we have at its end the growing point, out of which the whole cellular tissue of the fibre becomes developed. This

growing point is moreover encased with a cap *of firmer permanent tissue.* The root-cap, with its smooth, slippery surface and its conical form, facilitates the progress forward, and at the same time protects the delicate tissue of the growing point."

Page 14.—"Each *root-fibre* consists of a central or axial vascular bundle, or fibro-vascular cord, and a soft cortex of exceedingly thin-walled parenchymal cells surrounding it."

Page 17.—"Fundamentally, however, the roots are only the *bearers* of the proper organs for the absorption of food—namely, the *root-hairs.* These are exceedingly delicate-walled, narrow tubes—*some millimètres* in length, and *a few hundredths of a millimètre* in diameter—which grow forth from the surface of the roots in very large numbers. . . . *These tubes are simple protuberances of the outermost cortical cells of the root*; they arise on the recently developed part, and therefore *behind* the elongating region. In a *root* about twelve to twenty centimètres long they cover, however, by no means the whole surface, but only a piece of a *few centimètres in length; the root-hairs in fact die off again after a few days, and completely disappear.* It is therefore only a young, but completely elongated portion of the root which is covered with vigorous hairs. If we thus picture to ourselves a root as it grows longer, the posterior hairs die off in proportion as new ones arise behind the growing apex; thus the part of the root provided with hairs *moves forward.* If this takes place in the earth, it is obvious that *the portion beset with vigorous root-hairs comes in contact with such particles of soil as have before remained untouched.* Now it is the root-*hairs* by which the roots become capable of actually taking up the water and the nutritive matters of the soil. As these fine tubes grow in *between the particles of soil*, they *apply themselves here and there to them so intimately and firmly that they cannot separate again without injury.* . . . By means of this arrangement particles of earth are called into requisition in nutrition.

"A clear representation of the activity of the roots is only to be obtained when we picture to ourselves the richly branched root-system of a large, vigorous land plant, and reflect how the thin *root-fibres* travel through the soil in all directions, and that each thin *root-fibre* exhausts a cylinder of earth of several millimètres in diameter, and how the absorbing part of each root-fibre penetrates continually from day to day into *new, fresh portions of soil*, while the hairs disappear from the older parts of the fibres because there is nothing more there for them to seek. It may be added that only by the intimate growing together of the root-hairs with the earth-particles is it possible for transpiring land plants still to take up large quantities of water from a soil apparently almost dry, in order to transmit it to the green leaves."

Such being the structure and function of "roots" and root-hairs, we have now to consider that upon which they act, and out of which they obtain the water and mineral substances which constitute the food of plants.

At page 256, Dr. Sachs writes of *land plants*:—

"It is characteristic of their mode of life that they only flourish, as a rule, when their roots are distributed *on a soil which is relatively dry*, and only *incidentally* saturated with water. Thus just those plants which exhale the largest quantities of aqueous vapour by means of their assimilating leaves are adapted by their "roots" to a soil in which little water is contained ordinarily, and especially at the time when most water is made use of. It is in May, June, July, August, and September that the 'transpiration' and nutrition of our cultivated plants, field plants, and forest trees are particularly active—that is, at a time when the earth is only now and again completely saturated with water, while weeks and months often pass during which these plants have to take up large quantities of water from a soil which contains relatively only small quantities of that liquid. . . . The roots of land plants properly carry on

their functions continuously only when the surrounding soil is, as a rule, relatively poor in water; although a complete saturation of the soil for a short time does not at once act injuriously. Fields, of which the soil is too damp, are made in a high degree favourable to vegetation by drainage. The condition normally favourable for the roots of transpiring land plants is this,—that they are distributed in a soil which, in addition to small quantities of water, contains at the same time spaces filled with air, by means of which the transpiration of the roots is maintained. Very often, however, during long-continued drought the quantity of water sinks so low *that the soil appears almost air-dry; and it seems scarcely intelligible how the roots are able to extract from it the large quantities of water transpired through the leaves.*"

If I am right in supposing that the vegetable cell is capable of being conscious, and that the state of being *in great need of nutrition* is the state most likely to *give rise* to consciousness, the dearth of water—especially if it be extreme, in consequence of long drought—may present to us indications of the presence of consciousness.

"It thus concerns us to obtain an accurate notion as to *how* the roots of land plants accomplish the 'absorption' of such large quantities of water from a soil relatively poor in water. . . . We may confine our considerations to the behaviour of a single root-hair.

"*Each particle of soil is enveloped by a thin layer of water, which is held fast by 'surface attraction.'*

"Let us now regard a root-hair present amongst the particles of soil, but inactive, and suppose no disturbances at all to be taking place in the soil. Then all the aqueous spheres of the particles of earth are not only in contact with one another, but are also in a state of equilibrium.

"If we suppose the aqueous envelope of a particle of soil *to consist of several very thin layers*, then the molecules of the *elementary* layer [*the innermost layer which is in imme-*

diate contact with the particle of soil] will be attracted [by the particle of soil] with a *maximum force*, and the attractions of the other layers, as they are farther and farther from the particle of soil which they envelope, will diminish progressively, till the attraction of the particle of soil for the *outermost layer*, when the soil is saturated with water, *is only just great enough to prevent the water from dropping off*."

When the root-hair comes in contact with that "outermost layer" we can very well believe that the water of such outermost layer, being held by an attraction so slight, might pass through the cell-wall by osmosis or diffusion through a membrane. But the absorption by "osmosis" of the *next* layer would be opposed by the stronger attraction on the part of the particle of soil for it. *That opposition would be stronger for every fresh layer.* I think we can anticipate what is going to happen. Dr. Sachs says :—

"The more water the root-hair has already taken up the thinner are the aqueous spheres of the entire system, and the *greater will be the force* with which the *elementary* layer *now outermost*—[the only one left]—*is held fast*, and the greater must the forces be which draw the water into the wall of the root-hair. A condition of the aqueous envelopes may finally ensue when the 'elementary' layers *are held so fast by the particles of the soil* that no more water enters into the wall of the root-hair."

What does the reader think? So long as there was a sufficient supply in the form of the outer layers of water on the particle of soil—the first layer being held by so small an attraction that it was ready to "drop off"—we may allow that osmosis may be sufficient to supply the root-hair cell with sufficient water holding its food in solution. Will "osmosis" account for the drawing of water into the cell of the root-hair *against the increasing opposition* as the layers of water are nearer and nearer to the particle of soil? Whence arises the increase of the force exerted by the cell *drawing in* the resisting particles of water? It

certainly cannot be either chemical or physical. I think it can only be accounted for by a need for food, a "hunger," which has at last become so intense as to bring into action in the cell that capability of "conscious" action—of "efforting," in fact, which I think is a "fundamental property" of every cell, whether animal or vegetable.

We must not forget that Life is a Power, and that force is the action or activity of some power. The fundamental difference between the power Life and the chemical and physical powers is that, whereas on the one hand the chemical and physical powers are unable either to effort, or to *commence* any action, all their actions must be "*initiated*" by some action external to themselves; on the other hand, Life can *commence* actions. A need of something being experienced by a living existence giving rise to more or less intense "desire" may lead to action, though it does not always do so: I may feel great need of something to eat, but it may lead to no action; still it *may* lead to action. It may be replied that the "need" itself is the cause of action, which is quite true; but a "need" is not a thing, but a *state*. If I be in a state which leads me to act, it is still "I" who act, not the "state." Now, it is only living things that have *needs* and *desires*. In non-living substances there are no *needs* and no *desires*. Oxygen and hydrogen under certain circumstances unite, and the result of their union is the formation of water: that is, when, by the action upon them of some external force, they are brought into a certain relation with one another, the result is the formation of water. But it is not any *need* that brings them together. Oxygen does not *want*, does not *desire*, to unite with hydrogen. If it did, if it felt a want, a need, a desire for hydrogen, and were capable of being *conscious* of that need, and were also capable of *commencing*, of "*initiating*" motion, and of *adapting*, *governing*, *directing* such motion in such ways that the result should be its union with hydrogen, and the result of their *union* was

the formation of water, then the oxygen would act like a living, conscious existence; but it does not so act, for it is not living, not capable of consciousness.

But suppose oxygen *was* capable of being conscious, suppose the presence and absorption of hydrogen at certain intervals to be necessary to its well-being, and suppose that these intervals were periods of, say, twelve hours. Let us also suppose that, somehow, the hydrogen was generally *in contact* with the oxygen, so that its need was supplied without conscious action; suppose that at the beginning of the seventh hour the need for hydrogen began to arise, and that, from some cause or other, there was no hydrogen in contact with it. The "need," nevertheless, has as usual arisen at the beginning of the seventh hour, and goes on increasing in intensity up to the last minute of the twelfth hour; for up to that time no hydrogen has made its appearance. If the need began to be supplied before the expiration of that last minute, consciousness would not arise; if not, if no hydrogen presented itself at the end of the last minute of that twelfth hour, then the want, the need, would be so intense that consciousness would be aroused by the pain of the unsupplied want, and oxygen would bestir itself to *seek* for hydrogen. It would act as a living plant-cell acts under similar circumstances—it would "*effort*;" just as a root-hair has to effort where the action of osmosis ceases to supply its need for water and its contained salts.

I cannot but think that whatever action takes place between the entrance of water into the cell-wall and its passage through the primordial utricle into the cell-cavity is the result of the more or less conscious action of the power Life. I will again quote the words of Dr. Vines:—

"In discussing the absorption of substances in solution by the cell-walls, . . . the matter of primary importance is the passage of substances through the primordial utricle. We shall see that, of the many substances which readily pass through the cell-wall, some cannot traverse the

primordial utricle at all, and others only in small quantity; and the conclusion that we shall arrive at will be, that it is *the primordial utricle which determines what substances and what quantity of them shall enter the cell.*

"But we must bear in mind that we have here—[in the primordial utricle]—a *living* and *not a dead membrane* to deal with, and consider that the laws which regulate osmosis through the latter may be, and probably are, *profoundly modified in the former by the vital forces which are active in it.*"

Dr. Sachs continues at page 259:—

"From these facts it is to be seen that it is by the intimate contact or attachment of the root-hairs with the particles of soil that they succeed in *sucking up* [!] into the plant the entremely thin layers of water of the latter. This union of root-hairs and particles of soil has, however, still another very important significance. Only by this means are they enabled to take from the soil the nutritive materials necessary in addition to the water. In fact, certain materials indispensable for the plant, such as sulphates of lime and magnesia, as well as extremely small traces of other nutritive salts, are without doubt dissolved in the thin layers of water which surround the particles of soil: this follows from the fact that the water running off from the drain-pipes of tillage soil contains these substances.

"But a number of the most nutritive materials *are held so fast in vegetable soil* that it is *impossible to wash them out* with such quantities of water as are conveyed to them by the rain. These materials (chiefly *potash, ammonia, phosphoric acid*, and the less important *silica*) are found in the soil in a peculiar combined condition: they are, as we are accustomed to say, 'absorbed.' . . . So much at any rate is established, that chemical compounds of 'potash,' 'ammonia,' and 'phosphoric acid' *are retained with great force* on the *surfaces* of the small particles of soil, forming extremely fine coats on them.

"But it is these substances which must be taken up by the root-hairs; and it is obvious that this is only possible by the root-hairs coming into the *closest and most extensive contact with the particles of soil*, since the nutritive materials clinging to the particles of soil are not soluble—or but very slightly so—in the layers of water; the root-hairs as they *apply* themselves fast to the surfaces of the particles must *themselves* affect the solution of the 'absorbed' materials.

"This [solution] they accomplish by means of the extremely thin membrane of the root-hair *being permeated with an acid fluid, which, coming in contact with the surfaces of the particles of the soil, renders soluble the molecules of the absorbed materials adhering there.* It thus becomes possible for these substances to *penetrate* into the root-hairs according to the laws of 'diffusion' [!], and thence to pass over into the stream of sap to be carried finally to the organs of assimilation."

Allowing this to be correct, how is it that the root-hairs come to "apply themselves so closely"? Is it not from conscious need?

At page 264 . . . "the fact is clearly demonstrated that the plant undertakes the absorption of its nutritive matters *by means of its own activity, and is by no means simply passive.* [It is not, then, *merely* a process of osmosis, though doubtless that has its place; but there is the plant's own activity besides.] . . . The root-hairs, after they have become closely applied to the particles of soil, have to take up the water 'clinging fast' to the latter, as well as the equally closely attached nutritive substances."

Then they have *to tear away both the water and the attached nutritive substances by force*, which, I think, can only be accounted for by conscious action on the part of the root-hair, such consciousness being aroused by the need of food. Dr. Sachs is himself obliged, though grudgingly, to admit "selective" power on the part of the root-hair. At page 287 he writes:—

"This opportunity may be taken of remarking *that the roots possess a sort of selective power*, as it has been called, as to *quantity* at any rate, even if not as to *quality*."

Speaking of some experiments, he says: "If, for instance, the solution contains more calcium than potassium, the subsequent analysis of the plant-ash may yield more potassium than calcium, and so forth. This fact, depending on a power of *quantitive selection* on the part of the plant, is evident in the thousands of ash-analyses which have been made of the most various plants developed in the open. Plants of different species, which have been grown close together on the same soil, or in the same water, exhibit totally different combinations in their ash—the one having much, the other little, of calcium compounds; in the one, magnesium and calcium predominate, in the other, potassium. . . . While sea-water contains 3 per cent. of common salt, and only very small quantities of salts of potassium, magnesium and calcium, the salts last named predominate in the ash of these plants, and it contains relatively but little of the common salt of the sea-water.

"Plants thus *take what they require* from a mixture of salts, without particular reference to the composition of the nutritive mixture."

Dr. Vines says:—

"Only such substances can be absorbed by the root-hair *as are present in larger proportions in the water* to be absorbed *than they are in the cell-sap of the root-hair*; this *inequality* between the proportion of any substance in solution in the liquid on the one side and in the membrane on the other *is a necessary condition of osmosis*."

Then, supposing that in the cell-sap in the cavity of the cell there happens to be a given quantity of a certain needed substance, while on the outside of the cell there happens to be a larger quantity of such substance, it will enter the cell by "osmosis," and the process of absorption will continue until there are equal quantities in the cell-sap and on the

outside of the cell. But supposing the quantity in the cell-sap is *insufficient*, but is *yet greater* than is present on the outside of the cell, "osmosis"—as defined above—cannot take place, for the "necessary condition" of osmosis is not present. And it would seem, so far as the particular substance is concerned, the cell must starve, unless, indeed, it is possessed of some power by means of which it is able to "override" the process of "osmosis," and can take up, by the use of that power, the substance it needs, although it is present in larger quantity in itself than is present outside, which I think it does. While the quantity outside is *greater* than the quantity inside, the "conscious" action of Life is not needed, and the action of osmosis may be sufficient. But when the quantity outside is *less* than the quantity inside, when it is *insufficient*, consciousness is aroused, and the root-hair *applies* itself—as in the case of the *last* layer of water in the particle of soil—"closely and intimately," and "tears away" all that *can* be torn away of the last remnant of water, and at the same time brings into strong action the "acid sap which saturates the cell-wall," and, to use the words of Dr. Sachs, "*undertakes the absorption of its nutritive matters by its own activity, and is by no means simply passive.*" . . The root-hairs, after they have become *closely applied* to the particles of soil take up the water clinging fast to the latter, as well as the equally closely attached nutritive substances.

Dr. Sachs says:—

"This opportunity may be taken for remarking that *the roots possess a sort of selective power*, as it has been called, as to quantity at any rate, even if not as to quality. . . . Plants thus *take what they require from a mixture of salts, without particular reference to the composition of the nutritive mixture.*"

It would seem, then, that so long as "osmotic" action is sufficient to cause the entrance of *sufficient* nutritive

substances into the cell-cavity, there may be little or no conscious action on the part of the cell. But when osmotic action is *insufficient*, and hunger becomes great, *the cell awakes to action, and consciously does what it can to supply its needs.*

CHAPTER XIII.

IDENTITIES OF ANIMAL AND VEGETABLE ACTION. CONCLUSION: VEGETABLE CELLS ARE CAPABLE OF BEING CONSCIOUS.

In an article in *Nature*, July 19th, 1888, on "Vegetable Rennet," Mr. W. E. Denning gives a most extraordinary example of identical action of plants and animals. He writes:—

"The idea that the protoplasm of living substances of both animals and plants is *essentially similar, if not quite identical*, has long been accepted by both physiologists and botanists. . . . It is not difficult even here to trace a remarkable similarity of properties in the living substance, which leads to the conception that not only is protoplasm practically the same in animal and vegetable, but that its activities in the two cases—that is, the *metabolic processes which accompany, and are in a way the expression of its life—are fundamentally the same*. . . . The vegetable protoplasm produces 'starch,' the animal 'glycogen,'—both carbohydrate bodies of similar composition and behaviour. In both organisms we meet with 'sugars' of precisely similar character. The 'proteid' bodies long known to exist in animals, and classed into albumins, globulins, albumoses, peptones, etc., have been found to be represented in vegetables by members of the same groups, differing but in minor points from themselves. We have *fats* of complex nature in the animals represented by *oils* of equal complexity in the vegetable,—*their fundamental composition being identical*; even the curious body '*lecithin*,' so long

known as a constituent of the nervous tissue in the animal, having been procured from the simple yeast-plant. Further, the changes which give rise to these bodies, or which bring about various transformations of them, have been in very many cases demonstrated to be due to similar agencies at work in both the animal and vegetable organism. In many cases, no doubt, they are produced by the actual splitting up of the protoplasm itself; but apart from this we have their formation in large quantities by the agency of bodies which are known as *unorganised ferments*, and which are *secreted by the protoplasm for the purpose of such formation.* Perhaps no line of research in vegetable physiology in recent years has been so productive of good results as the investigations that have been made into the occurrence of such bodies, and the comparison of them with those that are met with in the animal organism. Diastase in vegetables, and the ferments of saliva and of pancreatic juice in animals, *possess the same power of converting starch into sugar.* The peptic and tryptic ferments of the stomach and pancreas respectively have been shown to have representatives in the vegetable kingdom; and these not only in such cases as the carnivorous plants, but to be actually made use of in such truly vegetable metabolism as the processes involved in the germination of the seed. The conversion of albumins and other indiffusible proteids into a further stage than that of diffusible peptone—that of leucin in the animal and asparagin in the vegetable—has been shown to be the work of such a ferment in the two cases. *These ferments, too, are interchangeable to a certain extent;* for those of the alimentary canal are capable of digesting the proteids of *vegetable* bodies, while those of the latter can similarly split up the *animal* albumins, fibrin, and other forms of proteid.

"Perhaps the latest development of the same idea has been the discovery of 'ferments' in the vegetable kingdom which are comparable in their action with the 'rennet' which

is obtainable from the stomach of many young animals, particularly the calf. In an 'extract' of such a stomach, taken while secretion of gastric juice is proceeding, or in the gastric juice itself, is a principle which has the power of curdling milk—a property taken advantage of by the farmer in the process of manufacturing cheese. The *casein*, which is the proteid concerned in cheese-making, is, under appropriate conditions, converted by this body into an insoluble form, which, for want of a better name, may be called briefly cheese. The conversion is not to be confused with the 'loose curdling' which takes place when milk becomes sour from putrefactive changes or from the addition of an acid, for it is a true 'coagulation,' resembling the 'clotting' of blood. Now, recent investigations show us that in many plants a similar ferment exists, which possesses an identical power, producing, when added to milk, a clot which is quite indistinguishable from that which is formed under the action of animal rennet. The list of such plants is continually increasing, but they do not appear to be grouped at all on the line of the recognised natural orders. Ranunculaceæ, solanaceæ, cucurbitaceæ, compositæ, galliaceæ, and others, furnish us with conspicuous examples."

But one of the most striking examples of the fundamental identity of the animal and vegetable cell is that, although we know of no animals—at least, I am not aware that we do—which commence their lives as plants, yet we do know of many plants which commence their existence by swimming about exactly like some of the lowest animals, during which period they display all those phenomena which Professor Foster has described in the case of the amœba as indicating the presence of rudimentary volition; and how can there be volition without consciousness?

We will proceed to consider various instances of similarity between plants and animals, and evidences of consciousness exhibited by the former as set forth by various writers.

In his Presidential address to the British Association in

the year 1879, Professor Allman—his subject being "protoplasm"—says (page 13) of the printed report:—

"That there is no essential difference between the protoplasm of plants and that of animals is rendered further evident by other motor phenomena which we are in the habit of regarding as the exclusive attribute of animals. Many of the more simply organised plants give origin to peculiar cells called 'spores,' which separate from the parent, and, like the seeds of the higher plants, are destined to repeat its form. In many cases these spores are eminently locomotive. They are then termed 'swarm-spores,' and their movements are brought about, sometimes by changes of shape, when they move about in the manner of an *amœba*—but more frequently by minute vibratile *cilia*, or by more strongly developed '*flagella*' or 'whip-like projections' of their protoplasm. These 'cilia' and 'flagella' are absolutely indistinguishable from structures widely distributed among animals, and by their vibratory or lashing strokes upon the surrounding water the swarm-spores are rapidly carried from place to place. *In these motions they often present a curious semblance of volition, for if the swarm-spore meet with an obstacle in its course, it will, as if to avoid it, change the direction of its motion, and retreat by a 'reversion' of the stroke of its cilia.*"

Can that "reversion" be accounted for without the presence of consciousness?

"They are usually attracted by light, and congregate at the light side of the vessel that contains them; though in some cases light has the opposite effect on them, and they recede from it [being too intense, one would naturally infer]. After swimming about for a time and leading the life of an *animal*, they subside into a state of rest, develop a wall of cellulose, and become *vegetable cells*."

Page 17.—"The beautiful researches which have been made on the 'division' of animal cells, shows how close is the agreement between plants and animals in all the lead-

ing phenomena of 'cell-division,' and afford one more proof of the *essential unity of the two great organic kingdoms.*"

In relation to the sensibility or "consciousness" of plants Professor Allman writes (page 22) :—

"But there is perhaps nothing which shows more strikingly *the identity of the protoplasm in plants and animals, and the absence of any deep-pervading difference between the life of the animal and that of the plant*, than the fact that plants may be placed, just like animals, under the influence of anæsthetics.

"When the vapour of chloroform or of ether is inhaled by the human subject, it passes into the lungs, where it is absorbed by the blood and thence carried by the circulation to all the tissues of the body. The first to be affected by it is the delicate nervous element of the brain, and loss of consciousness is the result. If the action of the anæsthetic be continued, all the other tissues are in their turn attacked by it, and their irritability arrested. *A set of phenomena entirely parallel to these may be presented by plants.*

"We owe to Claude Bernard a series of interesting and most instructive experiments on the action of ether and chloroform on plants. He exposed to the vapour of ether a healthy and vigorous 'sensitive plant' by confining it under a bell-glass into which he introduced a sponge filled with ether. At the end of half an hour the plant was in a state of anæsthesia : *all its leaflets remained fully extended, but they showed no tendency to shrink when touched.* It was then withdrawn from the influence of the ether, when it gradually recovered its irritability, and finally responded, as before, to the touch.

"It is obvious that the *irritability* of the protoplasm was here arrested by the anæsthetic, so that the plant became unable to give a response to the action of an external stimulus."

Then, again, some animals exhibit various phenomena which are generally supposed to be peculiar to plants, while

some plants exhibit phenomena generally supposed to be peculiar to animals.

At page 22 Professor Allman writes : –

"The action of chlorophyll in bringing about the decomposition of carbonic acid is not, as was recently believed, absolutely confined to plants. In some of the lower animals, such as *stentor* and other green hydra, and certain *green planariæ* and other worms, *chlorophyll is differentiated in their protoplasm*, and probably always acts there under the influence of light exactly as in plants. . . . Mr. Geddes has further shown that these animals (planariæ) contain *granules of starch* in their tissues, and in this fact we have another striking point of resemblance between them and plants."

At page 22 Professor Allman writes :—

"Again, Nageli has recently shown that the cell of the yeast-fungus *contains about 2 per cent. of peptone*, a substance hitherto known only as a product of the digestion of azotised matter by animals."

Page 25. –"The quite recent researches of Schutzenburger, who has investigated the process of respiration as it takes place in the cell of the yeast-fungus, have shown that *vitality* is a factor in this process [that is, that it cannot be resolved into more chemical or mechanical action]. He has shown *that fresh yeast placed in water 'breathes' like an aquatic animal*, disengaging carbonic acid, and causing the oxygen contained in the water to disappear. That this phenomenon is a function of the living cell is proved by the fact that if the yeast be first heated to 60° C., and then placed in the oxygenated water, the quantity of oxygen in the water remains unchanged; in other words, the yeast ceases to breathe.

"Schutzenburger has further shown that light exerts no influence on the respiration of the yeast-cell—that the absorption of oxygen by the cell takes place in the dark exactly as in sunlight.

"All this proves that the 'respiration' of living beings

is 'identical,' whether manifested in the plant or in the animal.

"One of the most valuable results of the recent careful application of the experimental method of research to the life phenomena of plants is thus *the complete demolition of the supposed antagonism between respiration in plants and that in animals.*

In his intensely interesting work on "Mental Evolution in Animals," Dr. Romanes, speaking of "Choice" *as proof of the presence of consciousness and volition,* writes (page 48):—

"I have observed that if a sea-anemone [a zoophyte or plant-like animal] is placed in an aquarium tank, and allowed to fasten upon one side of the tank near the surface of the water, and if a jet of sea-water is made to play continuously and forcibly upon the anemone from above, the result, of course, is that the animal becomes surrounded with a turmoil of water and air-bubbles. Yet, after a short time, it becomes so accustomed to this turmoil that it will expand its tentacles in search of food, just as it does when placed in calm water. If now one of the expanded tentacles is gently touched with a solid body, all the others close round that body in just the same way as they would were they expanded in calm water. That is to say, the tentacles are able to *discriminate* between the stimulus which is supplied by the turmoil of the water, and that which is supplied by their contact with the solid body, and they respond to the latter stimulus notwithstanding that it is of *incomparably less intensity* than the former. And it is this power of 'discriminating' between stimuli *irrespective of their relative mechanical intensities* [Dr. Romanes' italics] that I regard as the objective [mind] of which we are in search; it constitutes *the physiological aspect of Choice.*

"*A similar power of discriminative response has long been known to occur in plants,* though the most carefully observed facts with regard to this interesting subject are those which we owe to the later researches of Mr. Darwin and his son.

The extraordinary delicacy of 'discrimination' which these researches show the leaves *of plants to exercise between darkness and light of the feeblest intensity*, is not less wonderful than the delicacy or 'discrimination' which they show the *roots* of plants to exercise *in feeling about for moisture and lines of least resistance in the soil.* But in the present connection the most suggestive facts are those which have been brought to light by Mr. Darwin's previous researches on the climbing and insectivorous plants. For, from these researches, it appears that the power of discriminating between stimuli, *irrespective of relative mechanical intensity or amount of mechanical disturbance, has here proceeded to an extent that rivals the functions of nerve-tissue*, although the tissues which manifest it have not in structure passed beyond the cellular stage. Thus, the tentacles of Drosera which close around their prey like the tentacles of a sea-anemone, will not respond to the *violent* stimulation supplied by raindrops *falling* upon their sensitive surfaces or glands, while they *will* respond to an inconceivably *slight* stimulus of the kind caused by an exceedingly minute particle of solid matter exerting by gravity a *continuous pressure* upon the same surfaces. For Mr. Darwin says, 'The pressure exerted by a particle of hair, weighing only $\frac{1}{78740}$ of a grain, and supported by a dense fluid, must have been inconceivably slight. We may conjecture that it could hardly have exceeded *the millionth of a grain*; and we shall hereafter see that far *less* than the 'millionth of a grain' of phosphate of ammonia in solution, when absorbed by a gland, acts on it and induces movement. . . . It is extremely doubtful whether any nerve in the human body, even if in an inflamed condition, would be in any way affected by such a particle supported in a dense fluid, and slowly brought into contact with a nerve. Yet the cells of the glands of Drosera are thus excited to transmit a motor influence to a distant point, inducing movement. It appears to me that hardly any

more remarkable fact than this has been observed in the vegetable kingdom.

"But the case does not end here. For in another insectivorous plant, Dionœa, or Venus's fly-trap, the principle of 'discriminating' between different kinds of stimuli has been developed in a direction exactly the *opposite* to that which obtains in Drosera. For while 'Drosera' depends for capturing its prey on entangling the latter in a viscid secretion from its glands, Dionœa closes upon its prey with the suddenness of a spring-trap; and in relation to this difference in the mode of capturing prey, the principle of 'discriminating' between stimuli has been correspondingly modified. In Drosera, as we have seen, it is the stimulus supplied by 'continuous pressure' that is so delicately perceived; while the stimulus supplied by impact is disregarded; but in Dionœa the smallest 'impact' upon the irritable surfaces, or filaments, is immediately responded to, while the stimulus supplied even by comparatively great 'pressure' upon the same surfaces is wholly disregarded. Or, in Mr. Darwin's own words, 'Although the filaments are so sensitive to a momentary and delicate touch, they are far less sensitive than the glands of Drosera to prolonged pressure. Several times I succeeded in placing on the tip of a filament, by the aid of a needle moved with extreme slowness, a bit of rather thick human hair; and these did not excite movement, although they were more than ten times as long as those which caused the tentacles of Drosera to bend, and although in this latter case they were largely supported by the dense secretion. On the other hand, the glands of Drosera may be struck with a needle or any hard object once, twice, or even thrice, with considerable force, and no movement ensues. This singular difference in the nature of the sensitiveness of the filaments of Dionœa and the glands of Drosera evidently stands in relation to the *habits* of the two plants. If a minute insect alights with its delicate feet on the glands of Drosera, it is caught by

the viscid secretion, and the slight, though prolonged pressure gives notice of the presence of prey, which is secured by the slow bending of the tentacles. On the other hand, the sensitive filaments of Dionœa are not viscid, and the capture of insects can only be assured by their sensitiveness to a momentary touch, followed by the rapid closing of the lobes. So that in these two plants the power of discriminating between these two kinds of stimuli has been developed to an equally astonishing *extent*, but in *opposite directions*.'

"But we find definite evidence of this power of 'discriminative selection' even lower down in the scale of life than the cellular plants ; we find it even among the protoplasmic organisms. Thus, to quote an instructive case from Dr. Carpenter :—

"'The deep-sea researches in which I have recently been engaged have not "exercised" my mind on any topic so much as on the following ;—Certain minute particles of living jelly, having no visible differentiation of organs, . . . build up "tests" or casings of the most regular geometrical symmetry, and of the most artificial construction. . . . From the same sandy bottom, one species picks up the *coarser* quartz grains, cements them together with *phosphate of iron*—which must be secreted from their own substance —and thus constructs a flask-shaped "test" having a short neck and a single large orifice. Another picks up the *finer* grains, and puts them together with the same cement into perfectly spherical "tests" of the most extraordinary finish, perforated with numerous small tubes, disposed at pretty regular intervals. Another selects *the minutest* sand-grains and the terminal points of sponge spicules, and works these up together—apparently with no cement at all, but by the "laying" of the spicules—into perfect spheres, like homœopathic globules, each having a single-fissured orifice.'

"*Thus, co-extensive with the phenomena of excitability,*

that is to say, with the phenomena of Life, we find this function of 'selective discrimination.'"

If, then, a careful examination of the opinions of the highest authorities on animal and on vegetable physiology, shows that the "fundamental properties" of the animal cell and of the vegetable cell are identical;—if we find that plants propagate in exactly the same way as animals propagate;—if we find that their processes of "absorption" by "osmosis or diffusion through a membrane" are fundamentally similar;—if we find that plant cell and animal cell alike possess power, by the operation of which they can, when necessary, "override" the process of osmosis;—if we find plants, like animals, suffering from the action upon them of anæsthetics, and, like animals, recovering from the effects of such action;—if we find plants producing substances supposed to be peculiar to animals, and animals producing substances supposed to be peculiar to plants;—if we find vegetable ferments identical in their action with those of animals;—if we find plants breathing like animals, the conditions and processes of their respiration being the same as they are in animals;—if, above all, we find plants possessing the marvellous powers of "selective discrimination" described by Dr. Romanes, and of nerve-like action as described by Mr. Huxley:—is it possible to doubt that plants, like animals, are capable of being conscious? Is it possible, in view of the evidence I have adduced, to come to any other conclusion than that the differences between the animal and vegetable kingdoms have not arisen because the protoplasmic cell of the animal and the protoplasmic cell of the plant are essentially different, but are simply the results of different conditions, different modes, and different degrees of development?

Some of my readers may perhaps have observed that I do not speak either of animals or plants as "possessing consciousness," but of being "capable of being conscious."

To speak of any creature "possessing" consciousness would seem to imply that to possess it once would be to possess it always. Now, consciousness is not a "thing," but a "state" of something, and no creature "capable" of being in that "state" is always in that state. Even a human being is not always conscious. The most "living" of men is not, as a rule, conscious more than—say sixteen or eighteen, or even twenty hours out of the twenty-four; and during that period his consciousness varies greatly in intensity. After a good dinner it is usually not very vivid; and, if a man be in the habit of indulging in "forty winks" afterwards, his consciousness becomes, by degrees, less and less, till it ends in *un*consciousness.

May we conclude that every living cell is capable of being conscious? I venture to think we may. But there is another, and, I think, final argument.

The primal protoplasmic speck must have commenced its existence in water. Except in water it could not live, for only in water could it procure the mineral substances needful for the maintenance of its Life. It was, necessarily, what we call a "vegetable" cell; for none of those organised combinations of inorganic substances upon which alone the animal cell can live had yet been formed. There existed no organised substances. Before an "animal" could live the organised substances necessary for its food had first to be formed by the vegetable. After their formation the evolution of an animal cell became possible. The conditions—the existence of fitting food materials—being present, the animal cell was developed. *But it was only a development of the vegetable cell*, and all the properties the animal cell possessed must have been potentially present in the vegetable cell. Nothing could be present in the animal cell which was not also present, though undeveloped, in the vegetable cell, for the one was only a development of the other. The only difference between them was a difference of development. When we inquired of the Animal

Physiologist what were the fundamental properties of the animal cell, we were informed that the animal cell is—

Contractile,	Digestive, etc.,
Irritable,	Metabolic,
Automatic,	Reproductive.
Secretory, or excretory,	

When we inquired of the Vegetable Physiologist what were the "fundamental properties" of the vegetable cell, we were told that the vegetable cell is—

Absorptive,	Contractile,
Metabolic,	Automatic,
Excretory,	Irritable;
Reproductive,	

that, in fact, the "fundamental properties" of the animal cell and of the vegetable cell are identical; and we see clearly why there could be no other answer, for the animal is only a development of the vegetable, and could not possibly possess any "properties" which were not possessed by the vegetable: if it did, we should have an effect without a cause, which would be absurd.

Psychology not being as yet considered to be a part of physiology—though it is, in fact, the most important part—Dr. Foster did not specify the "capability of being conscious" as one of the "fundamental properties" of the animal cell. Still less did Dr. Vines include amongst the "fundamental properties" of the vegetable cell the "capability of being conscious:" nevertheless, I think I may venture to say, that as the "fundamental properties" of the animal cell and of the vegetable cell are identical; that as the animal cell, which is capable of consciousness, is but a development of the vegetable cell; that as evolution is possible only on condition that whatever be evolved must have been present in that out of which it was evolved; that as the capability of being conscious is present in the animal cell, which was evolved out of the vegetable cell,—

the vegetable cell must have possessed, and still possesses, the capability of being conscious; a capability which is more or less exercised during the life of every cell, the most general cause of such action being the desire for food—that is, hunger.

The last of the fundamental properties of the cell we have to consider is its power of Reproduction.

CHAPTER XIV.

REPRODUCTION: TWO MODES—DIVISION OF AN ASEXUAL CELL—UNION OF TWO OPPOSITE SEXUAL CELLS.

LET us contemplate two specks of nucleated protoplasm. One of them is a human ovum, or germ-cell; the other is an ordinary amœba.

There does not seem to be much difference between them: they are both unicellular, and both seem likely to lead the same lives and to end in the same way; whereas the one (the amœba) will never become more than what it at present is—a single cell; while the other (the human ovum) will increase till it becomes a multitudinously multicellular existence consisting of millions of cells.

How has that increase, that development, been effected?

The ovum in question—like the amœba—is the result of that wonderful power possessed by life, called the power of Reproduction.

Of that power there are said to be two modes of action, the one called asexual or non-sexual, the other sexual. In the former, the non-sexual, reproduction is effected by what is called Fission or Division, in which a cell, or nucleated mass of protoplasm, spontaneously divides into two,—the nucleus dividing as well as the protoplasm. Each of the two halves becomes a new cell. The original cell is called the "mother"-cell, or the "parent"-cell. The two parts into which it divides are called daughter-cells. Each of these "daughter-cells" begins to grow, and continues to grow till it becomes similar to the mother-cell before the

"division" of the mother-cell occurred. On reaching maturity each of the daughter-cells undergoes the process of self-division, and each, in its turn, gives rise to two daughter-cells. These, again, in their turn, act like their mother-cells, and so continuous reproduction is effected. "Asexual" reproduction is also called "Vegetative" reproduction.

In the case of "sexual" reproduction the process is supposed to be different. The germ-cell is the result, not of the *fission* or *division* of a single cell, but of the *union* of two separate cells, or of a portion of each of them—the one of which is called the male cell or the male "pronucleus;" the other, the female cell, or the female "pronucleus." Neither of these is able to reproduce alone. Between these two modes of reproduction the variations are endless.

The following account of the non-sexual or vegetative reproduction is from the latest edition—the ninth—of the great standard work, "Quain's Elements of Anatomy," vol. i., page 8:—

"The *nucleus* of the cell is a minute vesicular body placed generally near the centre of the cell, and embedded therefore in the protoplasm. . . . Chemically, at least, there is no doubt difference between the nucleus and the protoplasm. Still, when we regard the spontaneous changes which are manifested by both, and especially the important part which the "nucleus" plays in the division of the cell, as will be immediately described, there is much in favour of the view which regards the nucleus as a portion of the living substance which is set aside, altered it is true in chemical nature, to preside over the multiplication and reproduction of the cell; and in favour of this there are observations which show that under certain circumstances *the nucleus may enlarge at the expense of the protoplasm, even to the extent of absorbing the greater part of the latter*, so that the *whole cell* is little else than *nucleus*; and, indeed, *this relative*

increase of the size of the nucleus seems to be a change which constantly precedes the phenomena of cell division.

"Cells multiply by division, the process being as a rule binary, each cell dividing into two other cells, these again into two, and so on. *The division of a cell is preceded and accompanied by certain changes in the form and constitution of the nucleus.*

"With comparatively unimportant modifications, *these changes are similar both in the animal and vegetable kingdom.*

"When a cell is about to divide, its nucleus—which may previously have presented the usual structure characteristic of resting cells, consisting, namely, of a vesicle containing a network of nucleoplasmic fibres—becomes transformed in the following way.

Page 16.—"It is found, as a general rule, that whilst cell division is proceeding, the *external manifestations* of *activity* of cell-protoplasm *cease almost entirely.*" [Hence the term—a "*resting*" cell.]

"In the first place, it—[the network of nucleoplasmic fibres]—appears rather larger and less defined, and *its interior* is found to contain a close interlacement or *skein of contorted filaments of nucleoplasm*, to which the nucleoli and intranucleolar network have given place, whilst the nuclear matrix has lost its affinity for staining fluids. Meanwhile the body of the cell has become more rounded in form, and the *granules* which are present in the protoplasm become arranged into two groups placed on each side of the cell.

"This condition of the nucleus passes gradually into one in which the filaments of nucleoplasm are *less fine and also less contorted*, whilst they are more separated from one another, as if the finer filaments had shortened themselves, and in shortening themselves had become proportionately thicker and farther apart.

"It is difficult to say if there is really only *one filament* twisted in a complicated manner on itself, or if there are

several intertwining filaments. But whether originally only one or several, in the next stage, if the latter is the case, their ends *join*, so that there is to all appearance *only one long nucleoplasmic fibre*, which becomes arranged in such a manner as to form a *rosette-like* structure looping alternately in and out from a *central space* which is *left clear*.

"The fibre or fibres next *separate into portions of equal length* (the separation generally occurring in the 'rosette' stage, although it may happen earlier). The change often *begins* at those parts of the 'rosette' which are to become the *poles* of the nucleus. The *peripheral* 'loops' of the 'rosette' become broken through, while the central 'loops' tend inward and *converge* towards the centre of the 'rosette' so that a *star* is the result. Occasionally the convergence is towards *two* points instead of one, so that a *double* 'star' is the result, the division of the nucleus being thus early indicated. This astral or amphiastral condition persists for some little time, but not always without alteration; for the aster is sometimes observed to undergo changes of form and size, becoming alternately more flattened, and again more rounded, and this so rhythmically as to have suggested the change being spoken of as the systole and diastole of the star.

"The fibres which form the *rays* of the 'star' often become *split longitudinally*, the cleavage extending gradually from the *free end* towards the centre, the result being that they are both more numerous and finer.

"In the next phase—which is termed by Flemming the *equatorial* stage of division—the V-shaped nucleoplasmic fibres have become collected *parallel* to one another in *the middle*, often leaving a space clear at either end; these 'spaces' being opposite to the poles of the nucleus. Collectively the fibres form a somewhat barrel-shaped system at this stage; in each fibre the *angle* of the 'V' *is directed towards one of the 'poles'* of the nucleus, whilst

the *limbs* either interlace or abut against one another at the 'equator.' Presently the fibres of the system are seen to be separating into *two groups*, leaving a clear space in the plane of the equator, and the two groups—gradually become more distinct from one another—travel towards the *poles* of the nucleus.

"From the two groups of fibres thus separated the *nuclei of the two new cells become derived*, and we may speak of them, therefore, as *the nucleoplasmic fibres of the 'daughter-cells.'*

"The mode in which they resume the structure of ordinary nuclei is by a *reversal* of the phases which were exhibited by the 'mother-nucleus.' Thus the nucleoplasmic fibres in each of the two 'daughter-cells' take on first of all a *stellate* disposition; next the *rays* of the star become united in *loops*, so that the *rosette* condition is reproduced, then each rosette becomes a *skein* of contorted fibres, and, finally, the normal condition of a resting nucleus is attained.

"Meanwhile the 'protoplasm' of the cell has begun to collect itself towards each of the two new nuclei. This often commences whilst the 'daughter-nuclei' are yet in the *stellate* phase. By the time they have arrived at the *rosette* stage, the 'protoplasm' has usually divided into two equal halves, the process being generally accompanied by a constriction which extends *in* from the exterior, and is presumably effected by the powerful and equal attraction which is exerted upon it by the new nuclei.

"The division of the cell is now complete.

"Sometimes a multiplication of nuclei within a cell occurs. The division of the cell itself occurs in these cases by a *portion* of the protoplasm gathering around *each* of the daughter-nuclei, and the original cell *thus dividing into as many new cells as there are 'nuclei' in it.*"

CHAPTER XV.

FORMATION OF ANIMAL SEXUAL CELLS (PRONUCLEI) BY EXTRUSION OF POLAR BODIES.

EVERY cell at the commencement of its existence is—like the cell described above—supposed to be "asexual," or "non-sexual." We have now to inquire how, from being non-sexual, a cell may become "sexual."

The change is supposed to be brought about by what is called the extrusion of the polar bodies, or polar globules. The following account is from Quain's "Anatomy," vol. ii., p. 16:—

"*Cell-nature of the mammalian ovum.*

"The ovum, as it occurs in the ovary, is a large cell enclosed in a distinct envelope; otherwise consisting, like other animal cells, of protoplasm and a nucleus."

[The description which follows applies to the ovum of the star-fish as observed by Fol and Hertwig; but the researches of Ed. von Boneden indicate that similar phenomena attend the extrusion of the "polar globules" in the mammalian ovum.]

"Special names have long been applied to these parts of the ovum. Thus, the 'nucleus' of the ovum is termed the *germinal vesicle*, and the main collection of the nucleoplasm within it—*the nucleolus*—is termed the *germinal spot*; while *the 'protoplasm'* of the cell has been termed the *vitellus* or *yolk*. Enclosing the whole is a thick, radially striated structure, the *zona pellucida*.

"The 'maturation' of the ovum essentially consists in

the extrusion of a portion of the nucleus or 'germinal vesicle,' together with a small amount of the protoplasm or 'vitellus' or 'yolk.' This process of extrusion appears to be really a *division* of the cell into *two very unequal portions*; the *larger* of the two being still termed the ovum, the *smaller—which may again divide into two*—being called the '*polar globule*,' or it might be better to term it an 'extrusion globule.' The following is the way in which this change becomes effected. Soon after the ovum leaves the ovary—or immediately before—its nucleus, which previously presented the structure typical of the nucleus of a 'resting' cell, shows indications of a change, and becomes transformed into a spindle-shaped system of fibres which is situated near the surface of the 'vitellus.' Presently one pole of the spindle is protruded from the vitellus into a space (perivitelline space) between the 'zona-pellucida' and the vitellus, caused by a shrinking of the latter. In the next place the substance of the nucleoplasmic fibres gradually collects towards the poles of the spindle *in much the same way as in the division of the nucleus in an ordinary cell*, and two 'daughter'-nuclei are thus formed, one remaining in the ovum, and the other, *together with a very small amount of the vitellus*, becoming free in the perivitelline space as a polar globule. This (that is, the polar globule) *may again undergo division*, or a *second* polar globule may be produced from *the nucleus of the ovum* in the *same way as the first*. The nucleus of the ovum now moves again towards the centre, there to await the advent of the fertilising agent. Since it is now somewhat different from an ordinary nucleus in its *incapability* to initiate the division of the cell without the access of a fertilising agent, as well as in structure, no neoplasmic network being visible, it is no longer termed the nucleus, but the *female pronucleus*."

The male "ovule" is, by some probably similar process, converted into a *spermatozoon*, or "male pronucleus," but

how it is effected is, as yet, a matter of the keenest dispute. After having set forth the conflicting opinions of the highest authorities, the author of the article in the *Encyclopædia Britannica* on "Animal Reproduction" (page 413) writes:—

"The first step towards any understanding of the process of spermatogenesis amid this maze of controversy is to collate the various observations. But how shall we reconcile the different theories? . . . Since La Valette, however, most observers have admitted the existence of several methods: *the homology, indeed the primordial identity of the primitive germinal cells, of male ovule with female ovule has been often pointed out.* . . . Various writers had also noted, besides the nucleus, the appearance of a small denser mass of protoplasm within the spermatocyte, the *accessory corpuscle*; but its origin and fate has scarcely yet been settled with complete clearness. . . . Von Brunn has recently described in birds the origin of this 'accessory corpuscle' with special clearness, by the division of the nucleus of the developing spermatozoon. In *mammalia* the 'cap' of the young spermatozoon is described by Renson as nucleus, and by others as protoplasm, and it has been compared by many authors to the *polar vesicle of the ovum.* In 'Plagiostome Fishes,' Semper describes, and others confirm, the existence of an additional nucleus, or *problematic body*, which appears to correspond to the sum of the '*accessory corpuscles*' of all the spermatozoa."

CHAPTER XVI.

FORMATION OF VEGETATIVE SEXUAL CELLS (PRONUCLEI) BY EXTRUSION OF POLAR BODIES.

THE examples given of the extrusion of the polar bodies have been from *animal ova*. Does the same process occur in the *vegetable ova*? If there does, how low down in the scale can it be traced?

At page 638 of his "Vegetable Physiology" Dr. Vines writes:—

"The next series of facts to which we have to turn our attention are those connected with development of the reproductive cells. Beginning with the asexual reproductive cells or spores, we have learned that they are produced by an organ which we have spoken of generally as the *sporangium*. In unicellular plants the cell which constitutes the body of the plant constitutes the 'sporangium' also.

"In some cases the spores are apparently formed from the *whole* of the protoplasmic contents of the sporangium. In many cases, however, *not all* the protoplasmic contents are used in the formation of the spores. For instance, in the development of the zoospores of the algæ a *portion* of the protoplasm is extruded in the form of a vesicle from the sporangium at the same time as the spores. In other cases of spore formation a peculiar process has been observed by Strasburger—namely, that just *previously* to the division of the spore-mother-cell, a mass of substance, termed the *paranucleolus*, is extruded from the nucleus."

The Algæ are amongst the lowest forms of vegetable life.

Is this the first indication that "extrusion of polar bodies" occurs in the plant cell as well as in the animal cell?

"Something similar has been observed in connection with the development of the 'antherozoids' in the Muscineæ and Pteridophyta. When the antherozoid is set free there is attached to its posterior end an appendage which is usually described as a protoplasmic vesicle. Now, as to the nature of this 'vesicle.' It has been ascertained that the antherozoid is developed mainly from the *nucleus* of the mother-cell, the cilia alone being derived from the *protoplasm.* But it has been suggested by Dodel-Port—and his suggestion is fully confirmed by the researches of Belajeff on the development of Isoëtes and Selaginella—that the so-called protoplasmic 'vesicle' *contains a portion of the 'nucleus' of the mother-cell which is excluded from taking part in the formation of the antherozoid.* Probably in all cases a portion of the nuclear substance of the mother-cell is thus excluded. The excluded portion of the mother-cell is termed a *polar body* [Dr. Vines' italics].

"Turning now to the *development* of a well-differentiated female gamete, we find more or less well-marked cases of the formation of a 'polar body.' A comparatively simple case is afforded by the Peronosporeæ. The oosphere of these plants is developed from a *portion only* of the protoplasmic contents of the oogonium; and there is reason to believe that a certain portion of the *nuclear substance* of the oogonium is excluded from the process. In certain of the algæ (Vaucheria, Œdogonium) an 'extrusion' of the protoplasmic contents of the oogonium has long been known to occur, and something of the same kind has recently been observed by Dodel-Port in *Cystoseira barbata.* It has not been definitely ascertained whether or not the extruded protoplasmic masses are nucleated, but they probably are, and may therefore be considered to be 'polar bodies.' There is no such doubt as to the corresponding cells formed in the female organ of the Muscineæ, the Pteridophyta,

and of most Gymnosperms. In these plants the central cell of the archegonium divides into two—a large and a small cell; the former becomes the oosphere, the latter is termed the *ventral canal-cell*, and subsequently undergoes degeneration. There can be no doubt that the latter is a 'polar body.'"

Page 664.—"With regard to the extrusion of the paranucleolus from the spore-mother-cell we have no direct evidence that it is essential to the differentiation of the spores as reproductive cells, but the process is eminently suggestive. Strasburger suggests that the extrusion of the paranucleolus is the expression of the return of the cell to the 'embryonic' condition; but if we consider that spores are specialised reproductive cells, differing from the somatic embryonic cells of the plant in that they add neither to the *tissues* nor the *organs* of the parent, but develop into *distinct organisms*, we are led to conclude that the 'extrusion' of the paranucleolus—if it means anything—means *more* than this. The significance of the process is probably this: *that it marks the 'differentiation' of a 'reproductive' from a 'somatic' cell.*"

"We may put the case in this way: that if the 'extrusion' of the paranucleolus did not take place, the division of the spore on germination would lead to the production, not of the body of a *new 'organism,'* but of *mere repetitions of itself.*

"Passing now to the consideration of the significance of the extrusion of the polar body in the development of 'gametes,' we find that there is reason to regard it as of profound significance. There is, in the first place, the fact that a 'gamete'—in the development of which the extrusion of a polar body has taken place in any form—is, as a rule, *incapable, by itself*, of developing into a new individual. In the second place there are—in families of plants in which the differentiation of the gametes is *usually accompanied by the extrusion of a polar body*—instances in

which this *does not take place*; and in these instances the cells produced are not *gametes*, but *parthenogenetic spores*" [that is, asexual instead of sexual spores]. "Of these two points the first is sufficiently clear not to require elucidation, but it will be advantageous to illustrate the second."

The case of the Saprolegnieæ is considered, and the result is :—

"The explanation of the fact that the reproductive cells formed in the oogonia of the saprolegnieæ are oo*spores* and not oo*spheres*, appears to be this; that in their development the necessary exclusion of a portion of the protoplasmic contents of the oogonium does not take place."

That is, that there is not, as usual, extrusion of the polar body or bodies.

"The conclusions as to the physiological significance of the extrusion of the polar body to be drawn from the foregoing discussion are the following :—

"It appears, in the first place, in view of the parthenogenesis of the Saprolegnieæ—the only case, be it said, which has been thoroughly investigated—*that the extrusion in some form of a polar body is an essential part of the development of a gamete.* It is true that the extrusion of a polar body has not been observed in the case of all plants, but the observations on the subject are not so numerous or extended as to warrant the inference that the process does not take place in all. In the second place, in view of the fact *that the essential feature of the sexual process is the coalescence of the nuclei of the two gametes*, we cannot but conclude that the extrusion of the polar body involves in all cases the extrusion of *a portion of nuclear substance.* Finally, we conclude that it is this reduction of its nucleo-idioplasm [a name given to the substance of the nucleus] which determines the sexuality of the reproductive cell; when the reduction does not take place the product is not a *gamete*, but a *parthenogenetic spore.* We accept Balfour's

view, *that the extrusion of the polar body is the means by which parthenogenesis is prevented*, and we may add, the means by which cross-fertilisation is rendered possible. A 'gamete' is, as a rule, converted into a 'spore' by means of the sexual process: *two reproductive cells*, neither of which contains sufficient nucleoplasm for independent germination, form by their coalescence one which does."

The same writer, speaking of the polar bodies, says:—

"Two or more polar bodies may be formed, but they never take any part in the subsequent life-history of the ovum, and sooner or later disappear.

"Having arrived at these conclusions respecting the sexuality of gametes, we go on to inquire into the nature of sex.

"Strasburger and Weismann are of opinion that male and female gametes—oospheres and antherozoids, for example—are *essentially similar*. From this point of view it is then merely the *external adaptive peculiarities* of the gametes which constitute 'sex.' But we shall endeavour to show that this opinion is not in harmony with the known facts of reproduction.

"The main objection to the view of Strasburger and Weismann is, that it fails to afford any explanation of the phenomena of 'sexual' reproduction. If male and female gametes are essentially 'alike,' why is it that two oospheres or two antherozoids never coalesce, but only antherozoid with oosphere; and how are the manifestations of sexual affinity to be accounted for?

"They attempt to meet this objection by reference to Pfeffer's observation that, in cases in which the sexual cells are well differentiated, the female organ excretes a substance which has an attractive influence, and that it is only the corresponding male cells which are susceptible to this influence. The reason why two antherozoids or two oospheres do not coalesce is then this,—that they do not attract each other; and it is for the same reason that a

coalescence of gametes of opposite sexes, but not of the right degree of sexual affinity does not take place. But the facts observed by Pfeffer do not really touch the point at issue. The attractive substances in question serve, it is true, to bring the motile male gametes—which may be produced at a distance—into proximity with the female; but there is no evidence that they determine the actual *coalescence* of the two gametes."

But it is, at any rate, a wonderful instance of *consciousness in the cell.*

"We cannot but conclude that the facts of sexual reproduction cannot be satisfactorily accounted for, otherwise than on the assumption *that male and female gametes are essentially diverse.* It is, in fact, *because* they are 'diverse' that they are male and female; it is just this essential diversity that constitutes Sex.

"It seems probable that the difference between a male and a female gamete is brought about in the course of their development, and it is probably closely connected with the extrusion of the polar body. It may be that the loss of substance is not qualitatively the same in the development of a male and female gamete respectively. This view has been stated by Minot and Van Beneden in this way: *that in the extrusion of the polar body from the developing female cell, the male constituent is removed; and similarly that in the extrusion of the polar body from the developing male cell the female constituent is removed.*"

Page 636.—"In the mode of reproduction called parthenogenesis, or virgin reproduction without 'fertilisation' spore-formation takes place; but the spore, instead of being the product of asexual process, is developed without that process—that is, apogamously: hence the sporophore is developed from a spore which is the homologue of those which are sexually produced, but which, as a matter of fact, has not been sexually produced; sexual spore-formation is replaced by asexual."

In parthenogenetic reproduction there may be an indefinite series of asexual reproduction; but sooner or later there is a return to sexual reproduction, from which there again occurs "reversion" to asexual reproduction.

When sexual reproduction is followed by only one asexual reproduction, which is followed by only one sexual reproduction, it is called "Alternation of Generations."

CHAPTER XVII.

IS THE OPINION THAT THERE ARE REPRODUCTIVE CELLS DESTITUTE OF SEX, SUPPORTED BY FACTS?

ALTHOUGH both animal and vegetable physiology recognise various modes of reproduction—asexual, sexual, fissional, conjugational, parthenogenetic, and various others—it would seem that all these modes may be resolved, more or less clearly, into the two first—namely, asexual reproduction and sexual reproduction.

The asexual or non-sexual cell is said to multiply or reproduce by self-division or fission in such manner that by the division, first of the nucleus, and later by the division also of the protoplasm, the cell becomes two, which are like the first. The first cell is called the mother-cell; the two cells resulting from the division of the mother-cell are called daughter-cells, and are non-sexual. When the two daughter-cells reach maturity they multiply exactly in the same way as the mother-cell—that is, non-sexually.

The sexual cell also multiplies or reproduces by division into two daughter-cells in exactly the same way as the non-sexual cell, but with this remarkable difference,—that while, on the one hand, the *non-sexual* cell produces daughter-cells which are *like itself*, that is, *non-sexual cells*, and which in their turn produce non-sexual cells; the *sexual* mother-cell, instead of reproducing two daughter-cells, which are, *like itself*, *sexual cells*, produces two daughter-cells which are *non-sexual*, and which reproduce *non-sexual cells*.

So from two seemingly directly opposite causes we have identical effects; a conclusion the acceptance of which is so difficult as to lead to a suspicion that somewhere there must be a mistake.

If there *be* a mistake, is it in relation to the non-sexual cell or to the sexual cell?

As the non-sexual cell reproduces non-sexual cells—which seems the natural thing for it to do—while the sexual cell reproduces non-sexual cells—which seems the very opposite to what it might reasonably be expected to do—it would seem that a consideration of the origin and nature of the sexual cell would be the most likely to lead to an explanation of the difficulty.

As the sexual cell does not reproduce a "sexual" cell, but reproduces a "non-sexual" cell, it would seem *that all cells, without any exception, must primarily be non-sexual cells*; for how could a cell possibly be otherwise, seeing that both sexual and non-sexual cells reproduce only non-sexual cells?

CHAPTER XVIII.

SEXUAL CELLS ARE UNI-SEXUAL AND NON-REPRODUCTIVE. —UNION OF OPPOSITE UNI-SEXUALS PRODUCES A REPRODUCTIVE DUO-SEXUAL.

How, then, do *Sexual* cells arise?

We will begin with an ovum or egg-cell, which, as no cell reproduces sexual cells, must necessarily be non-sexual. How, then, from being a non-sexual cell, does it become changed into a sexual cell? It becomes changed into a sexual cell by the "extrusion of the polar body or bodies," by means of which it loses a small portion of its nucleus and of its protoplasm, and becomes what is called the "female pronucleus," that is to say, it becomes a "sexual" cell; but at the same time *it has lost the power of reproduction* which it—in common with all non-sexual cells—previously possessed, so that the change would seem to be not an advantage, but a disadvantage.

"How, then, does it become capable of reproduction?

It regains it by its union with another cell, which, like itself, has undergone the process of "extrusion of the polar body or bodies," and has become a pronucleus of a different kind to that of the female; it has become a male pronucleus, and like the female pronucleus, *it* also has lost the power of reproduction, which as a non-sexual cell it previously possessed. It has also lost nearly the whole of its protoplasm, and is little more than a nucleus with a covering of protoplasm. When these two sexual but non-reproductive cells unite they form a "sexual" cell

which *is* reproductive, but produces, not sexual but asexual cells.

Is the cell resulting from the union of the male and the female pronuclei to be considered an asexual cell? Or is the ordinary so-called *asexual* cell in reality duo-sexual? And is there no such thing as a non-sexual cell? Let us try to get at the truth of the matter.

Reasoning from current opinions, it must be considered as certain that all cells are, at the commencement of their existence, what is called asexual—non-sexual. Let us examine those opinions, and observe whether they fit in with the phenomena presented.

The non-sexual ovum cell by the loss of a certain portion of its substance becomes sexual. Is that "sex" an addition to it, a loss to it, or a modification of it?

It is certainly a loss to it, for we have seen it part with a portion, both of its nucleus and of its protoplasm; and there is certainly no sign of any *addition* to it. But, as we have seen, there are many signs of its *modification* during the processes which result in its finally becoming a sexual pronucleus, most especially as evidenced by its having lost its power of reproduction—*of reproducing by itself alone*, that is; for by fusional union with another and different pronucleus—male or female, as the case may be—its power of reproduction is restored.

But whence comes the "male" pronucleus?

Like the ovum cell, and indeed like all cells, it commences as a non-sexual cell. By a similar "extrusion" of a portion of its nucleus and a portion of its protoplasm, it, like the ovum cell, becomes a "pronucleus," but of a different kind: it becomes a male pronucleus, and, like the female pronucleus, has lost its power of reproduction.

These two pronuclei unite, the union being the entire fusion of the two. Together, they form a cell which is called a *sexual* or *germ cell*, and which possesses the power of reproduction. This "sexual" cell appears to be in

all respects like a "non-sexual" cell, and reproduces by division exactly as the non-sexual cell reproduces.

We have thus gained a knowledge of three kinds of cells: the male pronucleus, which is sexual, but non-reproductive and only *uni*-sexual; the female pronucleus, which is sexual, but non-reproductive and only *uni*-sexual; and the *germ-cell*, resulting from the union of the male and the female pronuclei, which is *duo-sexual* and *reproductive*.

We *know* that the *germ* cell is duo-sexual, because we have witnessed the process by which it has been produced —namely, by the union of the male uni-sexual pronucleus with the female uni-sexual pronucleus.

Let us closely examine the modes of formation of the pronuclei.

We postulate two asexual cells, one for each pronucleus. By the extrusion of a part of the substance of one of these asexual cells we have in the residuum a "sex"—the female.

By the extrusion of a part of the asexual cell, we have in the residuum, not a similar result, not another female, but another "sex"—the male; if both the cells were alike—if one extrusion leaves the male sex and if the other extrusion leaves the female sex—it necessarily follows that both cells must *at first* have been not *non*-sexual, but *duo*-sexual.

Further, as neither of the uni-sexual cells were, *by themselves*, capable of reproduction, but when, by their *union*, they formed a duo-sexual cell which *was* capable of reproduction, it clearly proves, I think, that in order to reproduce *at all*, a cell must be *duo*-sexual.

If we did not know—having witnessed their separate existence and the process of their union—that the two sexes were present in the "*germ*" or "*sexually*" *formed* cell, we could only take it for a non-sexual cell, for it reproduces in exactly the same way as a non-sexual cell—namely, by division, the resulting cells being also non-sexual.

If we refuse to believe that the ordinary so-called asexual cell is really duo-sexual, the only alternative, in face of the mode in which we have seen each of the sexes arise from an asexual cell, is to believe that one of the asexual cells was a non-sexual cell *containing* in itself a *male* sex, and that the other was also a non-sexual cell containing in itself a *female* sex, which is absurd ; for it at the same time affirms the presence of sex and its absence.

I think it does not admit of a doubt that there is no such thing as a non-sexual cell, but that all cells are born *duo*-sexual,—though a duo-sexual cell may, by the loss of one of its sexes, become *uni*-sexual, but while it remains in that uni-sexual state it is incapable of reproduction, for it is only a demi- or half-cell. But if it unite and fuse with another and *opposite* demi-cell the two become one, and the "germ-cell" resulting from that union is duo-sexual and therefore capable of reproduction.

We might, I think, advantageously distinguish the different cells of which we have been treating as—

First, the *simple* or duo-sexual cell.

Second, the uni-sexual, demi- or half-cell—male or female, as the case may be.

Third, the duo-sexual germ,—or compound cell, formed by fusion of a uni-sexual male, or demi-cell with a uni-sexual female, or demi-cell.

Let us a little further consider the asexual view. First, we have the unmatured ovum-cell, which is asexual. It presents the appearance of a resting cell which is about to reproduce itself in the ordinary way—that is, by division. Certain changes occur which seem in no way to differ from those which in an ordinary cell precede, and finally culminate in the division of the mother-cell into two daughter-cells. We have thus the ovum, forming, by its asexual division, two daughter-cells ; the one called the polar globule, the other still called the "ovum." One of the daughter-cells—which is much bigger than the other—remains within

the ovum, and the other, together with a very small amount of the vitellus or yolk, becomes free in the *perivitelline* space between the protoplasm or vitellus or yolk and the surrounding structure, the zona pellucida, as a polar globule. This [polar globule] *may again undergo division*, or a second polar globule may be produced in the same way as the first."

As the extruded "polar globule" is capable of reproducing itself, it must, of course, be asexual; and, as the nucleus of the "ovum" is also capable of reproducing itself—that is, of reproducing another polar globule—*it* must also be asexual, for both reproduce in the same asexual way—by division. It is quite clear that both the polar globules and the ovum are perfect asexual cells—at least, so far as reproduction is concerned.

We will suppose—as is usually the case—the number of extruded globules to be two. The result of these two extrusions is, that the ovum-nucleus has *somehow* lost its asexuality and has become sexual, and has in the act of becoming sexual lost its power of reproduction except by fusion with another kind of sexual cell called the male pronucleus. It therefore now moves again towards the centre, there to await the advent of the fertilising agent.

One naturally inquires how this change from non-sexual to sexual has been effected. Why did the asexual ovum-cell—having twice multiplied by division suddenly—without any assignable reason whatever lose its ability to do so, except by means of the help of another stranger-cell which, like itself, had lost the power of reproducing itself asexually and which also needed help? When, in a reproducing cell the nucleus divides, the division is usually into equal parts; but if there *be* an inequality it is always in favour of the mother-cell—so much so, indeed, that the mother-nucleus may divide off from itself an indefinite number of nuclei, small in comparison to herself, each of which takes with it a proportionally small amount of protoplasm or yolk or

vitellus, and grows to a complete cell. So the change from asexual to sexual, and the loss of reproductive power, *cannot be owing to an inadequate nucleus*, as has been affirmed; neither can the change be consequent upon *an insufficient quantity of yolk or protoplasm*, because, as we have seen, the author above quoted writes:—"This process of extrusion appears to be *really a division of the cell into two very unequal portions*, the *larger* of the two being still termed the 'ovum,' the *smaller*, *which may again divide into two*—being termed a polar globule;" respecting which the writer of the article on "Reproduction" in the *Encyclopædia Britannica* says (p. 416), "Two or more polar bodies may be formed, but they never take any part in the subsequent life-history of the ovum, and sooner or later disappear."

Thus the fact of the asexual reproductive ovum becoming sexual and unable to multiply is left wholly unexplained. We are simply told that the facts are as recounted, and nothing more: *the two suppositions of inadequate nuclear substance and insufficient protoplasm* which have been offered by many as explanations of the change from asexual to sexual are clearly erroneous.

CHAPTER XIX.

DUO-SEXUAL EXPLANATION OF MULTIPLICATION BY DIVISION, AND THE ORIGINATION OF NON-REPRODUCTIVE UNI-SEXUAL CELLS.

EXAMINATION of the phenomena of asexual reproduction gives no solution whatever to the problem of the origination of "sexual" pronuclei.

Let us consider the problem from the duo-sexual standpoint. From the duo-sexual point of view the problem becomes wholly different. It is not, How does *sexuality* originate? but, How does *uni*-sexuality originate?

I postulate—That all cells are born *duo-sexual* and *reproductive*; that every cell is capable of being conscious; that a given cell *may lose one of its sexes*, the male or the female, as the case may be, and by such loss becomes a *uni-sexual demi-cell*, which, being *uni*-sexual, is incapable of reproduction; that two opposite uni-sexual non-reproductive demi-cells by their fusion become one duo-sexual reproductive cell. For the sake of convenience I term such a cell a compound cell.

The simple duo-sexual cell is the result of the duo-sexual action of the cell which produces it. It is not the result of a mere mechanical division of an asexual cell into two parts.

"Multiplication" by "division" is on the very face of it an absurdity; for the division of a unit into two is not reproduction, but the division of one unit into two halves; and in the case of the division of an asexual or sexless cell

into two, the relations of mother and daughter cannot arise. If I cut an orange into two halves, are the two halves the "daughters" of a "mother" orange? There has been no reproduction, but only a change of relations of place to each other of the parts which composed the orange.

Multiplication is merely another way of stating addition. Twice nine are eighteen—that is, nine added to nine are eighteen. Division is another way of stating subtraction. *Divide* eighteen by two, or *subtract* nine from eighteen, and nine are left. Subtract one half of the orange, or divide it, and one-half of the orange is left. The half subtracted and the half left, together equal the orange. In so-called asexual or sexless multiplication by division there is no "addition," and therefore no "multiplication."

When a cell divides, its division is the result of the duo-sexual action of the power Life which is present in the cell, having reproduced from itself another "Power" like itself, and which separates from itself. The cell which contained the power which has produced from itself another power like itself produces that new power without itself being less, except as regards the physical substance in which it exists. The reproducing cell is a true Parent, the produced cell is a true Child, and the produced child possesses all the powers possessed by the parent who has given it birth. In place of the orange let us take a living duo-sexual reproductive organism. The cell consists of a mass of nucleated protoplasm, present in which is a life possessing the sex, or father-and-mother abilities, the exercise of which results in reproduction. It multiplies *first*, and divides *afterwards*.

Previous to reproduction, or multiplication, or addition, the Life may be represented by a hundred, and the protoplasm by ten. Previous to reproduction the cell contained the hundred and the ten. After reproduction it contained two "hundreds," the parent-hundred, and the child-hundred, that is, *two* "hundreds" but it contained only *one* "ten."

There had been multiplication of *Life*, the "child-hundred;" but there had been no "multiplication" of the *protoplasm*, that is, of the Ten. Therefore, as there is only one ten for the two hundreds, each has half. The parent retains five, or less or more, and the child *takes* five, or less or more. There has been "multiplication" of the *Life*; there is only "division" of the *protoplasm*.

The asexual theory gives no multiplication or addition, but merely division or subtraction.

The Duo-sexual Theory gives both.

We are now in a position to inquire how the uni-sexual non-reproductive demi-cell has originated.

It must be taken as absolutely certain that there is a difference of some kind between the organisation of the male element and the organisation of the female element, and that the one is the complement of the other; for if it were not so, two males or two females could, by fusion, give rise to a child—which we have seen they cannot do. In a given family, no matter of what organic rank, some of the children are more like the mother than the father, and some are more like the father than the mother; which, in the former case, proves that the mother-element was the more powerful; in the latter case, that the father-element was the more powerful. Sometimes one of the parental elements and sometimes the other is continuously the most powerful; sometimes only for a greater or less number of generations; sometimes for only a single generation.

In the lowest forms of life—in the "simple" uni-cellular duo-sexual cell—there is no perceivable difference between parent and child, or only the very smallest difference: the one seems to be a fac-simile of the other. But as we rise in the scale of organisms we find the possibilities of difference continually increasing, till in the highest mammalia we find the greatest and most numerous differences.

The simple duo-sexual cell, or rather, the life inhabiting it, being capable of being conscious, is capable of desiring. Its

principal desires are food and sex. The former is present in it from its birth ; the latter does not generally arise until it has reached maturity. The newly born Life is subject to the actions and reactions of the sum of changing substances and forces in the midst of which it exists ; and to which we give the name of its "environment." The living cell acts and reacts upon that environment, and endeavours to obtain from it such substances as it needs. It also endeavours to adapt that environment to itself, and, if needful, to adapt itself to that environment, in such ways as shall be for its benefit. The higher the organism the greater its ability to adapt its environment to itself, and itself to its environment.

But there is *another* "environment" besides the one just spoken of—an environment which the child-life at its birth receives from its parent ; *the particular mass of protoplasm and nucleoplasm* in which it is contained and lives, and which is the medium by means of which it acts upon the outer environment of things, and by means of which the outer environment acts upon *it*. The quantity and quality of this "inner" environment is consequent upon the character and the abilities of the Life present in it. Dr. Dallinger, the great microscopist, describing one of the very lowest of living organisms, writes : "The diameter of the body of the unicellular organism *bacterium termo—i.e.*, from side to side—may in different forms vary from the twentieth to the fiftieth thousandth of an inch." On the other hand, the magnitude of the highest mammalian ovum is from the hundred-and-twentieth to the hundred-and-fiftieth of an inch. Clearly differences of quantity and quality of protoplasm indicate differences of ability. By "quality" I mean complexity of organisation.

We have seen that sometimes the paternal and sometimes the maternal element displays itself most powerfully in the offspring. Does that "power" consist in the superiority in quantity and quality of the nucleoplasm and the protoplasm

of one of the sex-powers over the quantity and quality of the nucleoplasm and protoplasm of the other sex-power? If so, how did such superiority originate? One thing is certain, that, however caused, such superiority actually exists.

It also appears to be certain that the particular *organisation* of the substances on which and by which the opposite sexes act must be different; and the differences must be of such a nature that the state and character of the life and of the protoplasmic and food substances present in the cell at a given period must be such that sometimes their state and character are more favourable to the organisation of one sex than of the other.

The two most powerful incentives to action are hunger and sex.

From birth to maturity the life in the cell is principally engaged in the processes of metabolism. But when the cell reaches maturity the desire for food, which has been the cause of the cell's activity, ceases, and the new desire for reproduction arises. If at such period the whole state of the substances composing the organism be such as to be equally favourable for the organisation of both sexes, the child will resemble both parents; if it be more favourable for the male organisation, the child will be likest the father; if it be more favourable for the female organisation, the child will be likest the mother.

If, during successive generations, circumstances continue, during the organisation of the sex elements, to be more favourable to one sex than the other, *the predominance of that sex over the other will tend to increase*, and in course of time may become *so great* that *reproduction may become impossible.* The cause of sterility is too great likeness or too great difference.

By the aid of these observations we may perhaps be able to understand the two modes of reproduction: that of the "simple" duo-sexual cell, and that of the "compound"

duo-sexual cell; and also the mode in which the uni-sexual non-reproductive cell originates.

The division of a simple duo-sexual cell.

"The division of a simple cell"—I quote from the account previously given—"is preceded and accompanied by certain changes in the form and constitution of the nucleus; with comparatively unimportant modifications *these changes are similar both in the animal and vegetable kingdom.*

"When a cell is about to divide" [strictly speaking, when the phenomena which culminate in reproduction *commence*] "its nucleus, consisting of a vesicle containing a network of nucleoplasmic fibres, becomes *transformed* in the following way. In the first place it appears rather larger and less defined, and its interior is found to contain *a close interlacement or skein of contorted filaments of nucleoplasm*, to which the nucleoli and intra-nucleolar network have given place."

The "*nucleoli and intra-nucleolar network*" may be taken to represent that organisation of the nucleus by means of which the life performed the processes of *metabolism and growth.* The "*close interlacement or skein of contorted filaments*" would seem to be the commencement of the organisation of the sexes leading to *reproduction.*

"Meanwhile the *body* of the cell has become—if previously flattened or elongated—more rounded in form, and it may often be observed that the *granules* which are present in the protoplasm *become arranged in two groups* on each side of the cell.

"This condition of the nucleus passes gradually into one in which the filaments of nucleoplasm"—[as the state of the cell *changes* from *the protoplasm-manufacturing organisation* into *the organisation for reproduction*]—"are *less fine*, and also *less contorted*, whilst they are rather more separated from one another, as if the finer filaments had *shortened themselves*, and in shortening had become proportionately

thicker and farther apart."—We are in the very heart of the reproductive action.

"It is difficult to say if there is really *only one* filament twisted in a complicated manner on itself, or if there are *several* intertwining filaments. But whether originally only one or several, in the next stage [I think, the consummation], if the latter is the case, *their ends join*, so that to all appearance there is *only one long nucleoplasmic fibre* which becomes arranged in such a manner as to form a rosette-like structure or star looping alternately in and out from a central space which is left clear."—And "multiplication" is completed and "division" commences.—"The fibre or fibres next *separate* into portions of equal length."

Of these two portions one is the parent and the other is the child, and each can reproduce itself. If, on "division," the sex-organisations are equal, the child will be sexually equal to the parent. If they are unequal, the male or the female sex will predominate, as the case may be.

The remainder of the account refers to the return of both parent and child to the state of the parent previous to multiplication.

The changes are summarised thus :—

Parent:

Network.

Skein.

Rosette or Star.

Parent and child:

Rosettes or Stars.

Skeins.

Networks, and division of protoplasm so that at the close both parent and child are in that state in which the life-object is that of nutrition and growth. When maturity is reached their life-object will change from nutrition and growth to that of reproduction.

Such is the life-cycle of a simple duo-sexual cell.

We will now consider the "maturation" of the ovum, the

extrusion of the polar globule, and the origination of the uni-sexual non-reproductive demi-cell.

It will be necessary to requote a portion of the description previously given of the maturation of the ovum and the extrusion of the polar globules.

"So far as is at present known, every cell in the animal body has been derived from a previously existing cell. If we trace back the development of which the body is at one time entirely composed—the so-called *embryonic cells*—we find that they are originally produced by the division of a single cell derived from the female parent, and termed the *ovum* or *egg-cell*."

Instead of which, I hold, and hope clearly to show, that they are not produced by mere division of the female ovum or egg-cell, but by multiplication first and division afterwards, of a cell composed by the union of two uni-sexual non-reproductive demi-cells—of which the ovum furnishes only one—and whose proper name is the Germ-cell.

"The '*maturation*' of the ovum essentially consists in the '*extrusion*' of a portion of the nucleus or germinal vesicle together with a small amount of the protoplasm or vitellus. This process of 'extrusion' appears to be really a *division of the cell into two very unequal portions*, the larger of the two being still termed the ovum, the smaller, *which may again divide into two*, being termed a polar globule, or it might be better to term it an extrusion-globule. The following is the way in which this change becomes effected.

"Soon after the ovum leaves the ovary, or immediately before, its nucleus—which previously presented the structure typical of a 'resting' cell"—[that is, of a cell in which the organisation of the two sexes has commenced]—"shows indications of a change and becomes transformed into a spindle-shaped system of fibres, which is situated near the surface of the 'vitellus' or 'yolk.' Presently one pole of the spindle [the 'child' cell] is protruded from

the surface of the vitellus into a space (perivitelline space) between the 'zona pellucida' and the vitellus, caused by a shrinking of the latter. In the next place the substance of the nucleoplasmic fibres gradually collects towards the poles of the spindle in much the same way [*exactly* the same way] as during the division of the nucleus in an an ordinary cell [it *is* an 'ordinary,' that is, a 'simple,' duo-sexual cell], and two 'daughter' cells are thus formed, one remaining in the ovum, and the other, *together with a very small amount of the vitellus or yolk, or protoplasm*, becoming free in the perivitelline space as a polar globule."

That is, what we have just read is a description of the sex-organisations in the ovum cell and their united action, of which the results are the reproduction or multiplication or addition of a new life; the parting by the father-and-mother cell—the "ovum" cell—with only *a very small portion of its protoplasm* to the newly born cell, and the final separation of that new born cell from the parent cell, the ovum cell; the newly-born cell being called a "polar globule," which, the writer says, "may again undergo division—that is, multiplication first, and division afterwards—*which proves that it is a duo-sexual reproductive simple cell.* "Or," the writer continues, "a second polar globule may be produced from the nucleus of the ovum in the same way as at first. The nucleus of the ovum now moves again toward the centre of the ovum, there to await the advent of the fertilising agent. Since it is now somewhat different from an ordinary nucleus in its *incapacity* to initiate the division of the cell without the access of a fertilising agent, as well as in structure, no nucleoplasmic network being visible it is no longer termed the nucleus, but the female *pro-nucleus*."

The above description of multiplication and division of the ovum cell is that of an ordinary simple duo-sexual reproductive cell, and the only remarkable thing stated is the *great disproportion* between the size of the parent

father-and-mother ovum cell, and the size of the child cell; nevertheless, both the parent cell and the child cell divide in the same way. The parent cell produces another *disproportionately small child cell*; but the child cell produces a cell *similar in size to itself*. The reproduction of both is not limited: it may stop with the first or a second, or it may go on to a third, or even a fourth, but sooner or later it stops. When the ovum cell ceases to reproduce, the cause assigned is, that it has become unable to do so, that it has lost its reproductive powers, and we naturally want to know *why* it has lost it. But no reason is given but that it is somehow owing to the extrusion of the polar globules—which seems to be no reason at all. The pigmy insignificant polar globules are capable of reproduction; why is the great ovum cell incapable?

It seems to me that the reason is not far to seek. All living organisms are composed of one kind of material—protoplasm. The differences between one kind of protoplasm and another kind—say that between nerve protoplasm and muscle protoplasm—is a difference in their *organisation*, not in their *protoplasm*. When a "variety" is verging upon the result which we call the formation of a new species, it is because the sex-organisation of the diverging variety has become gradually more and more different from the sex-organisation of the species from which it originally "varied," until at last the difference between them becomes so great that reproduction between the species and the variation becomes impossible. That impossibility of reproduction together, or sterility, is the point at which the variety ceases to be a variety and becomes a new species.

In addition to the cause of sterility just stated, another cause may arise—*disproportion of sexual development in the same cell*. When one sex predominates over its opposite the effects of such predominancy is visible in the offspring; and I think it is clear that such sex predominancy may be so excessive as to produce sterility. I think that excessive

predominancy of one sex over the other causing sterility accounts for the change from duo-sexuality to uni-sexuality.

In the case of the ovum we have considered the striking circumstance in its first multiplication and division to be the *disproportion* between the size of the child cell and that of the parent cell. What is the cause of that difference? I I think it cannot be doubted that it is consequent upon the great superiority of the female sex-element over that of the male sex-element. I think the *cessation* of multiplication indicated by the non-appearance of any more polar globules or child cells in the case of the ovum cell is consequent upon overwhelming predominance of the female sex-element having been fatal to the weak male sex-element, and that its final and total disorganisation leaves the survivor "*uni-sexual*," and consequently *non-reproductive*.

By similar, or by analogous processes—for less is known on the subject—the male uni-sexual demi-cell is produced, and thus we have the opposite uni-sexual non-productive demi-cells which when united constitute the compounded duo-sexual reproductive "germ" cell, formed by the union of two sexes. But why should there be a change from the simple to the compound cell?

CHAPTER XX.

ADVANTAGES RESULTING FROM THE FORMATION OF THE "COMPOUND" CELL.

TAKING for granted that every individual cell, or rather, the individual life present in each cell, is capable of being conscious, and that hunger and sex are the great occasions of consciousness and the most powerful incentives to action, and that such action is purposive, it follows *that the fundamental cause of evolution is psychological.* The inner environment of protoplasm and the outer environment of things *are merely the occasions and conditions of the psychological action of the life.* The life consciously selects its food. It then decomposes it—I think into its ultimate atomic elements—for if it does not do so, I cannot see how the recombinations it makes out of the substances it has selected can possibly be effected. *How* the life in the cell decomposes and recomposes the substances it has selected as food science has not, as yet, formulated; but the effects produced are—as it seems to me—unintelligible, except upon the supposition I have stated.

I have spoken of protoplasm as varying in quantity and in quality. By quality I mean the degree of simplicity or complexity of its organisation. If the organism be simple, or small, the protoplasm has few points of contact with the outer environment, consequently the life, of which the protoplasm forms the medium of its action upon the outer environment, and of the action of the outer environment upon itself, has few desires excited in itself by its outer

environment, and acts but little upon that environment. If the protoplasm be high both in quantity and quality, it is much and variously affected by the action upon it of the outer environment; the inhabiting life has many desires excited in it and acts much and frequently and in many and various ways *through* its inner environment *upon* its outer environment. Its psychological action is more and more stimulated. It learns more and better modes of action. It organises its protoplasm more highly, and—by the operation of reproduction from a compound cell produced by the union of two opposite uni-sexual non-reproductive demi-cells—has at its command a greatly increased quantity of highly organised protoplasm—an amount capable by the same means of indefinite increase during successive generations.

In order very clearly to see the increase in the compound cell of highly organised protoplasm consequent upon the union of uni-sexual demi-cells, let us take a simple duo-sexual reproductive cell in which the sex elements are perfectly balanced, and when, consequently, there is no "preponderance" of one over the other. Let the sum of the two sex elements be 24. Let one sex—the female, say—begin to predominate so that its power shall at length be expressed by 18, while the other has decreased so that its power shall be expressed by only 6, at which point reproduction cannot be effected, and the sex-organisation indicated by the 6 is broken up—certainly becomes incapable of reproductive action with the 24. The predominant female element will now be expressed, not by 12, but by 18; but by the dissolution of the male element, the 6, the female element will have lost its power of reproduction, for it is now only *uni*-sexual.

Let us take another "simple" duo-sexual reproductive cell. Let a similar series of events result on the predominance of the male element till it reaches 18, and by the dissolution of the female element, which has been

reduced to 6 and finally broken up, it, like the female cell, has become *uni*-sexual, and therefore non-reproductive.

But when these two uni-sexual demi-cells unite, the result is a duo-sexual reproductive "*germ*"-*cell*, whose nucleo-plasmic and protoplasmic power may be roughly described as 36, and whose psychological power has been *doubled by the union of the two lives or souls present in the male and the female "pronuclei" respectively*, and *capable of an indefinite increase* of its powers by the continuous reproduction, through the same causes, of more and more powerful and highly organised uni-sexual demi-cells, and their unions as compound germ-cells.

As all modes of reproduction may be resolved into reproduction by a duo-sexual cell, either simple or compound, it will be unnecessary for us to consider the endless modes in which this principle, as expressed in reproduction by simple division, multiple division, parthenogenesis or reproduction successively by simple duo-sexual cell and compound duo-sexual cell, budding or germination, etc., is manifested.

CHAPTER XXI.

CELLS DIFFER IN DEVELOPMENT, NOT IN NATURE.—THE FUNDAMENTAL CAUSE OF EVOLUTION IS PSYCHOLOGICAL.

At page 44, it was written: "It would seem to be impossible to attain to any complete understanding of man's nature and constitution without first investigating, to the very best of our ability, the processes of Evolution of which he is the result, and coming to some distinct conclusion as to *how* that evolution was effected; the relations which the various parts of his body bear to each other and to himself, and what part or parts of the man constitute what we call Himself, and how it is that, notwithstanding he is a multitudinously multicellular organism, every man has an indestructible consciousness, belief, conviction, knowledge, feeling—call it what you will—that he is a person, an individual, absolutely and entirely different from all other existences; that for each man the total sum of existences consists of two factors—*Himself*, and *everything else*."

In our endeavour to solve the problems indicated it will be necessary to commence with the simplest manifestation of life—the single cell.

The results of our study of what is called the "lowest" description of cell, as set forth by the highest physiological authorities, are the following conclusions:—

That the cell is a minute mass of protoplasm in which there is present a power called a life, of which the protoplasm is merely the instrument by means of which the life acts

upon its "outer" environment, and by means of which the outer environment acts upon *it*.

That the life in the cell has thus two "environments": its *inner* or immediate environment of protoplasm, and its outer environment of things.

That the inner environment—the protoplasm—is the result of the action of the power Life on its outer environment.

That the life present in the cell possesses the power of extending and of contracting its protoplasm.

That the life in the cell is irritable and automatic: that is, that to the action of stimuli—originating either in itself or from its "environments"—acting upon its protoplasm, it can respond by movements of its protoplasm, many of which are not merely passive, but purposive—that is, adapted to ends.

That the protoplasm of the cell is receptive and assimilative: that is, that the life can take into its protoplasm various substances upon which it, together with the physical powers present in the substance of its protoplasm, can so act as to transform them, first into protoplasm, and can afterwards organise such protoplasm into structures, the special characteristics of which are great complexity and instability, and that the life can reject or excrete parts of the substances it has taken into its protoplasm which may be unnecessary or hurtful.

That the cell is respiratory: that is, that the life can take oxygen into its protoplasm and excrete carbonic acid.

That the life is capable of mutiplying itself without being itself diminished.

That the causes of the action of the life are its desires; and that of such desires the most powerful are hunger and sex, the avoidance of danger, and the presence of suitable temperature.

That as desire without consciousness is inconceivable, and the evidence of the presence and action of desire being overwhelming, it necessarly follows that the cell is capable

of being conscious. That in relation to reproduction there are four kinds of cells; the simple duo-sexual cell; the male uni-sexual cell; the female uni-sexual cell; and the compound cell, formed by the union of opposite uni-sexual cells, and thus constituting a unity composed of a duality.

That all cells, vegetable and animal, are essentially alike in nature and powers, and that the difference between the life or soul in one cell and the life or soul in another cell is a difference of development.

That the cause of evolution is efforting to satisfy desires, and as efforting without conscious purpose is inconceivable, the fundamental cause of evolution is necessarily psychological.

That "psychological" evolution means the gradual increase in the number, variety and intensity of desires.

That "physiological" evolution means the gradual increase in the number, variety and complexity of the means or instruments by which the increased number of desires may be more or less perfectly gratified.

That physiological evolution is thus *the consequent* of psychological evolution.

CHAPTER XXII.

UNICELLULAR ORGANISMS.—DESIRES OF THE CONSCIOUS CELL CAUSE EFFORTS TO SATISFY DESIRES, WHICH CAUSE EVOLUTION.

LIVING existences are divisible into two great classes: those which consist of only a single cell, and those which consist of a plurality of cells. Those which in the animal kingdom consist of a single cell are named "Protozoa." Those which consist of a plurality of cells are called "Metozoa" (that is, after or beyond Protozoa), or "Enterozoa."

The Protozoa are essentially unicellular animals, although we find protozoa which consist of aggregates of such cells, and are so far entitled to be called "multicellular;" but the cohesion of those cells is not an essential feature or condition of their life. Such an aggregation of similar cells is called a "plasmodium" or a "colony." But each cell is the counterpart of its neighbour; there is no division of labour, no distribution of function among special groups of associated cells; each cell may be detached from the rest and live an independent life; each cell is an independent individual.

As a contrast to this we find, even in the simplest multicellular organism, such as a sponge or a hydra, that the cells are functionally and structurally distinguishable into two groups—those which line the "enteron" or "digestive cavity," and those which form the outer body-wall. The cells of these two layers are not interchangeable; they

are fundamentally different from one another in properties, structure, and functions.

In the unicellular organism the psychological action of the life or soul inhabiting the cell expresses itself by *its increasing power to modify its inner environment of protoplasm so as to more and more effectually minister to the satisfaction of its desires.*

In the multicellular organism psychological action manifests itself in *increasing power over the increasing number of the cells as instruments for the satisfaction of desires.*

The first chapter in the long and wonderful history of animal evolution is that which treats of the development of the protozoa till they verge upon the enterozoa, the first forms of which must necessarily have arisen from some form of protozoa.

In Professor Ray Lankester's article on the Protozoa, in the latest edition of the *Encyclopædia Britannica*, we shall find the main facts of that chapter admirably and concisely set forth.

The protozoa are divided into two grades—the Gymnomyxa and the Corticata.

The lowest "grade" is the "*Gymnomyxa.*" Professor Lankester thus describes its characters:—

"The cell-protoplasm is entirely or partially exposed to the surrounding medium as a *naked undifferentiated* slime or viscous fluid, which throws itself into processes or 'pseudopodia' of various forms, either rapidly changing or relatively constant. Food can be taken into the protoplasm in the form of solid particles at any point of its surface, or at any point of a large exposed area."

We will notice some of the evidences of the increasing power of the protozoa over their inner environment of protoplasm, and their consequent increased adaptation of themselves to the circumstances in which they are placed.

Consideration of the development of the protozoa leads, I think, to the conclusion that the *lobosa* or amœbæ are

amongst the lowest forms of protozoic life. Dr. Lankester thus describes them (p. 841) :—

"Their pseudopodia are lobose, ranging in form from mere wave-like bulgings of the surface, to blunt finger-like processes, but never having the character of filaments either single, arborescent, or reticulate. . . . They do not form plasmodia [or masses of like cells or colonies], but often attain considerable size, forming masses visible to the naked eye. Some of its forms show considerable development."

In the *Heliozoa* we have gymnomyxa, in which the dominating amœba-phase has developed into spherical forms, and in place of the wave-like bulgings we have numerous isolated filaments, which must greatly increase its powers of action, which, however, exhibit very little movement or change of form, except when engaged in the inception of food particles, called into action by hunger.

In the *Reticularia* some throw out great trunks of branching and often anastomosing filamentous pseudopodia, while others form a shell of secreted membrane or secreted lime,—I suppose the membrane is "secreted" when lime is not to be had,—into which the protoplasm can be drawn, and out of and over which it usually streams in widely spreading lobes and branches, thus having greatly increased power of acting upon its outer environment, and of defending itself from enemies.

In the *Corticata*—the "higher grade" of protozoa—we come to protozoa whose substance is no longer simple, but in which the protoplasm of the cell-body in its adult condition and in its highest development *is permanently differentiated into two layers*, an outer denser *cortical substance*, and an inner more fluid *medullary substance*.

In the *Flagella* the dominant phase in the life-history is a corticate flagellula—that is, a nucleated cell-body provided with one or a few large processes of vibratile protoplasm, by means of which it propels itself through the water. Very commonly solid food particles are ingested

through a distinct cell-mouth or aperture in the cortical protoplasm.

Instead of the fixed or hardly moving amœba, with its development of filaments, which had to wait for prey, the protozoic cell is now able to swim about in search of it. It finds more and better and more solid food, which it cannot take in at every point of its surface indiscriminately. Hence the development of a fixed and fitting place of entrance in the shape of a permanent opening or mouth.

In the *Euglenoidea*, having become more adventurous and meeting more numerous enemies, a cuticle is developed—in some quite stiff, in others more advanced, firm, contractile, and elastic, which in still more highly developed forms is capable of definite annular contraction and worm-like elongation, and the mouth extends inwards as a more or less distinct pharyngeal tube. All these show an immense increase of *power to modify* the inner protoplasmic environment into forms more and more adapted to the satisfaction of greatly increased desires.

In the *Heteromastigoda* the flagella are increased to two.

In the *Chrysomonadina* we find spherical free-swimming "colonies" formed by grouping numerous individuals round a common centre.

In such "colonies" I think we have the first faint foreshadowing of the "multicellular" organism.

In the *Ciliata* we have almost the highest developments of the protozoa. In the *Holotrichous Ciliate*, for example, its cilia are disposed in longitudinal rows. Its cortical protoplasmic substance has an extremely delicate cuticle; its medullary or interior part being of a more fluid protoplasm. It possesses an oral aperture or mouth opening into a pharynx or gullet lined with vibratile cilia, by the action of which drops of water containing food-particles are drawn into its interior, where they form *food-vacuoles* which progress through the medulla by its "movements of rotation," the water

being gradually removed as the vacuole advances in position. In those which have not a permanent aperture the undigested remnants of food are expelled either by a temporary aperture in the body-surface, or by an opening into the base of the pharynx.

The formation of "tubes" or "shells," and in connection therewith of *colonies*, is common in some orders. The cuticle may give rise to structures of some solidity in the form of hooks or teeth-like processes, or as a lining to the pharynx.

At page 864 Professor Lankester writes :—

"The differentiation of the protoplasm of the ciliata in some cases as 'muscular' cannot be denied. The contractile filament in the stalk of *vorticella* is a *muscular fibre*, and not simple undifferentiated contractile protoplasm; that is to say, its change of dimensions is definite and recurrent, and *is not rhythmic*, as is the flexure of a cilium. The movements of the so-called 'setæ' of the *hypotricha* are also entitled to be called *muscular*, as also the general contractile movements of the cortical substance of large *ciliata*.

"Beneath the very delicate cuticle we very frequently find a layer of minute oval sacs which contain a spiral thread; the threads are everted from the sacs when irritant agents are applied. They appear to be identical in structure with the nematocysts of the *cœlentara* and *platyhelmia*. But there is a yet higher development in the last class of the "corticata," *the acinetaria*—which are described as "highly specialised corticate protozoa, probably derived from ciliata since their young forms are provided with a more or less complete investment of cilia. They have no vibratile processes on the surface of the body in the adult condition, while they have few or many delicate but firm tentacle-like processes, which are either simply adhesive, or tubular and suctorial. In the latter case they are provided at their extremity with a sucker-disk, and have *contractile* walls, whereas in the former case they have more or less pointed extremities. The *acinetaria* are sedentary in habit,

even if not, as is usual, permanently fixed by a stalk. *The nucleus is frequently arboriform.* Reproduction is effected by simple binary fission, and by a modified fission (bud-fission), by which, as in *reticularia* and *arcella*, a number of small bud-like warts, *containing a portion of the branched parental nucleus, are nipped off from the parent*, often simultaneously. These do not become altogether distinct, but are *for a time enclosed by the parental cell, each in a sort of vacuole or brood-chamber*, where the young acinetarian develops a coat or band of cilia and then escapes from the body of its parent. After a brief locomotive existence it becomes sedentary, develops its tentacles and loses its cilia.

"The first faint indication of *embryonic* life.

"The *acinetaria* have one or more contractile vacuoles.

"In the suctorial acinetaria a greater or less proportion, or often all the tentacles, are suctorial, and terminate with sucker-like expansions.

"In the non-suctorial the tentacles are filiform, prehensile, and not provided with a sucker.

"The *acinetaria* must be regarded as an extreme modification of the protozoon series in which the differentiation of organs in a unicellular animal reaches its highest point. The sucker-tentacles are very elaborately constructed organs. They are efficient means of seizing and extracting the juices of another protozoon, which serves as food for the acinetarian. The ciliation of the *embryos* or young forms developed from the buds of acinetaria is an indication of their ancestral connection with the ciliata."

With the brief account just concluded of the organisation and abilities of the *highest* forms of the *ciliata* and the *acinetaria* it will be interesting to compare Dr. Ray Lankester's description of the *lowest* form of the protozoa,—the lobosa.

"The cell-protoplasm is entirely or partially exposed to the surrounding medium as *a naked undifferentiated slime* or viscous fluid, which throws itself into processes or

'pseudopodia' of various forms, either rapidly changing or relatively constant. Food can be taken into the protoplasm in the form of solid particles at any point of its surface, or at any point of a large exposed area.

"Their pseudopodia are lobose, varying in form from mere wave-like bulgings to blunt finger-like processes."

What a wonderful difference between the amount of power over the inner environment of protoplasm exhibited by the lobosan amœba and the highest ciliata and acinetaria!

Our investigation of the cause of the development of the protozoa which is the foundation of the long process of further development which culminates in man, leads to the conclusion that the cause of development has been the struggle for existence, and that the cause of the struggle for existence has been psychological—that is to say, conscious efforting to satisfy desires; the result being a gradual increase of power over the protoplasm in the midst of which the life or soul exists.

CHAPTER XXIII.

PASSAGE FROM THE UNICELLULAR ORGANISM TO THE MULTICELLULAR. THROUGH THE COMPOUND CELL.—THE EMBRYO.

THE great distinction between the protozoic unicellular organism and the enterozoic multicellular organism is, that the latter commences its existence as an embryo.

We have now to learn how that embryo originates; and shall, for that purpose, refer to Quain's "Anatomy" (vol. ii., p. 741):—

"Within a very short time after the formation of the *germ-cell* [the 'compound' cell] by the union of the male and female pronuclei, the blastosphere, as it is termed, or nucleated mass of protoplasm which results from the act of union, proceeds to undergo a process of division and multiplication [or, more correctly, of multiplication and *consequent* division] after the manner of ordinary cell-cleavage; and by the continued repetition of this process a considerable number of times, there is eventually produced a collection of *blastomeres* or *nucleated cells*, out of which the further development of the embryo subsequently takes place."

An embryo is an organism in which a portion, great or small as the case may be, of its growth and development takes place *before it leaves the germ-cell*; during which time it feeds upon, or is supported by, certain food elements contributed by some of the cells. This mass of cells capable of embryonic development has been called the "*germinal membrane*" or *blastoderm* in the higher animals, because of the *flattened* or *laminar* form which the collection of its cells generally presents.

"To this process of cell-division and multiplication in the fecundated ovum the names of *yolk-cleavage*, or more strictly *germ-segmentation*, are applied. *Though common to all the metazoa*, it presents many and great *variations* in the different classes of animals. . . . The stages of division or 'cleavage' or 'segmentation' are as follows:—

"First, the undivided ovum. Then the first vertical cleft, which divides the yolk into two. Next, a second 'vertical' cleft, which divides the whole yolk into four segments. In these two first stages the vertical clefts proceed *downwards* from the upper or 'germinal pole,' where they cross each other at right angles, to the lower or 'nutritive pole.' In the next stage the four segments divide into eight; but the new cleft is not vertical, but *horizontal* and parallel to the equator of the sphere, but at some distance *above* it, so that *the lower segments (or cells) are much larger than the upper cells* [a difference which, being of the highest importance, is to be most carefully remembered]. This, again, is succeeded by *radial* or *meridional* clefts, which, proceeding gradually from the "germinal" pole, divide, first the upper, and later the lower segments, so as to produce first twelve, and later sixteen segments. Two *equatorial* clefts follow, which have the effect of dividing both the upper and lower meridional segments, so as to produce, first twenty-four and subsequently thirty-two segments; and by a succession of similar alternating vertical and horizontal clefts a greater and greater multiplication takes place, but in such a manner as to give rise to *more numerous and smaller and closer* cells in the *upper germinal* and deeply coloured part, and *fewer and larger and looser cells below.*

"Up to a certain point the progression is regular, but when the number of segments has become considerable the regularity is no longer perceptible. A cavity at the same time appears—the *segmentation cavity*, which lies *between* the *smaller* cells of the upper and the *larger* cells of the lower division; and these two sets of cells

respectively correspond to the *upper* and *lower* 'layers' of the *blastoderm* of higher animals."

By the processes described the embryo is formed, all the cells being attached to each other either individually, or in the form of aggregations of similar cells called "tissues," each kind of tissue performing certain functions; and thus there is *a division of labour* of the various kinds of cells and tissues, which results in increased general efficiency of the organism. After a longer or shorter period of growth and organisation within the yolk-sac, the creature emerges as a multicellular organism.

What are the relations of these cells to one another?

Let us consider the matter on the theory I am endeavouring to work out—viz., that every cell is the "seat" of an "intelligence," or life, or soul, which is capable of being conscious, and is therefore a person; and that when a given life "multiplies" and "divides," it gives rise to another life like itself, without being itself diminished. Further than that, it *parts*, by a mechanical division, with a *portion of the mass of the protoplasm in the midst of which it exists, to the new life, which is the result of the reproductive power which the life possesses and has exercised.* The germ-cell having multiplied, and then divided its protoplasm with its child, there are now *two* lives, *one of which is a new life and owes its existence to the other.* The relation between them, therefore, is that of *parent* and *child.*

In asexual division there is no such relation, for one of the two cells no more owes its existence to the other than, when I cut a piece of lead into two halves, the one "owes" its existence to the other.

By the multiplication and subsequent division of the parent-cell and the child-cell we have *two more cells.* But let the reader well mark that while it is the *first* multiplication of the child-cell, it is the *second* multiplication of the parent germ-cell.

We have now four lives: the parent germ-cell and three

children ; two of which are its immediate descendants, and one the immediate child of the parent germ-cell's first child, and is consequently the grandchild of the parent germ-cell.

When a third multiplication and division takes place we have eight cells : the parent germ-cell, three immediate children of the parent germ-cell, two grandchildren, and two great-grandchildren.

At the eighth stage the total of cells would be 128 : the parent germ-cell, and 127 children ; of which seven would be immediate descendants of the parent germ-cell, while six would be immediate descendants of the first child-cell, the others being third, fourth, fifth, sixth, and seventh in descent from the parent germ-cell. The twentieth stage would amount to 524,288 lives, consisting of the parent germ-cell, 19 immediate children of the parent germ-cell, 18 immediate children of the first child-cell, and 524,250 varying from third to nineteenth in descent from the parent germ-cell.

The thirty-second stage would consist of 1,065,821,824 : the parent germ-cell, 31 immediate descendants of the parent germ-cell, 30 immediate descendants of the first child-cell, and 1,065,821,763, third to thirty-first in descent from the parent germ-cell.

Every cell is the descendant of the first, either immediate or more or less remote. *Every cell in a multicellular organism is therefore akin to every other cell, for they have all descended from one parent.* The mass of cells constituting a multicellular organism has been described as a "cell-republic," or as a "cell-monarchy." It is really a *cell-patriarchy.* For the first, the germ-cell, is the parent of every individual cell of the total of which the organism is constituted.

CHAPTER XXIV.

GERMINAL LAYERS.—SUBORDINATION OF CHILD-CELLS TO PATRIARCH-CELL.—THE GASTRULA.

In his great work on Comparative Embryology, Professor Balfour writes (vol. i., page 103) :—

"In all the metazoa the 'segmentation' [of the germ-cell] is followed by a series of changes which result in the grouping of the embryonic cells into definite layers, or membranes, known as *the germinal layers.* There are always two of these layers, known as the epiblast [ectoderm] and hypoblast [endoderm]; and in the majority of instances a third layer, known as the mesoblast [mesoderm, or middle layer] becomes interposed between them. It is by the further differentiation of the germinal layers that the organs of the adult become built up."

Of the development of the three layers Professor Balfour writes (vol. i., page 103) :—

"The *epiblast* or *ectoderm* is essentially the primitive integument: it gives rise to the skin, cuticle, nervous system, and organs of special sense. The *hypoblast* or *endoderm* is essentially the digestive and secretory layer, and gives rise to the *epithelium* lining the alimentary tract, and the glands connected with it.

"The 'epithelium' is a thin and delicate kind of cuticle, which lines the internal cavities and canals of the body, both closed and open, as the mouth, nose, respiratory organs, blood-vessels, etc., and which is analogous to the cuticle of the outer surface.

"The *mesoblast* gives origin to the general connective tissue, internal skeleton, the muscular system, the lining of the body cavity, and the vascular and excretory systems."

How, in the multicellular organism, is the great primary division of the cells into nutritive and animal, into ectoderm and endoderm, to be accounted for ?

The multicellular organism arises from the compound cell, and the compound cell arises from two unicellular demi-cells.

We find that the Life in the highly developed protozoon has developed—differentiated, specialised, functioned, its protoplasm in two directions ; the results being the division of its protoplasm into the *cortical* or *animal layer*, and the *medullary* or *nutritive layer*. The nucleus of the compound cell is surrounded by a large quantity of protoplasm. In the primary multicellular organism, arising from a cell compounded of two uni-sexual demi-cells, that protoplasm must exist in the different states of corticate and of medullary protoplasm. That "differentiation" has been effected by the psychological action of Life in efforting to satisfy desire. The male pronucleus contributes only a small portion of the protoplasm of the compound cell ; but it contributes a large portion of the nucleoplasm—a name given to the substance of the nucleus. Almost the whole of the protoplasm is contributed by the female pronucleus. The two cells, descendants of protozoic ancestors, from which the compound cell has arisen, having, by the psychological action of *efforting* to satisfy desires, *caused* the "differentiation" of their protoplasm into cortical and medullary, animal and nutritive, the compound cell must have present in it similar desires ; and amongst them, unsatisfied in the simple protozoic cell, is *the desire to subordinate its children to its own service.* I think that, when in the compound parent-germ-cell reproduction takes place, the action of that desire causes the parent to reserve to itself the major portion of the *cortical* part, nucleoplasm and protoplasm, which have

been specially devoted to the higher functions of movement and feeling, and to retain only a minor part of the *medullary* portion, which has been specially devoted to the functions of nutrition and assimilation, to its child. The consequence is, that the nucleoplasm and protoplasm of the *child* having been structured and functioned principally in the direction of nutrition and assimilation the child gives rise principally to cells in which nutrition and assimilation predominate, and which, by their accumulation, give rise to the inner or endodermal layer of vegetative or nutritive cells; while the *parent* principally gives rise to cells in which movement and feeling predominate, and which, by their accumulation, give rise to the outer or ectodermic or animal layer.

In this way, I think, the origin of the great primary division of the cells into cells which, on the one hand, minister principally to movement and feeling, and on the other minister principally to nutrition and assimilation, is to be accounted for ; and that the origination of the powerful compound cell has led to the development of the multicellular organism from the unicellular : the cause of these effects being psychological—that is, efforting for the satisfaction of desires—the outer expression of which is the struggle for existence, and the resulting survival of the fittest and luckiest.

The arrangement of the two kinds of cells in two layers—the "germinal layers," as they are called, seeing that from these two layers all the various kinds of cells, *including the mesodermic* or *middle layer* (to which both the "germinal layers" contribute) with their aggregational arrangements as tissues take their rise—is primarily effected by the process of "invagination," which eventuates in the formation of the "gastrula."

Page 104.—"The processes by which the 'germinal layers' take their origin are largely influenced by the character of the segmentation, which is *mainly dependent on the distribution of the food-yolk.* When the segmentation

is regular and results in the formation of a blastosphere [the hollow sphere formed by the sum of the segmentation cells], the epiblast and hypoblast are usually differentiated from the uniform cells, forming the wall of the blastosphere in the following way [the 'hollow' of the sphere is called the 'segmentation cavity'] :—

"One half of the blastosphere is *pushed in* towards the other half. A two-layered hemisphere is thus established, which soon elongates, while its opening narrows to a small pore. The embryonic form produced by this process is known as a gastrula [in Zoology an organism in which the stomach is the most prominent part]. The process by which it originates is known as 'invagination.' Of the two layers of which it is formed the outer is known as the epiblast or ectoderm, and the inner as the hypoblast or endoderm. The pore, or opening, leading into its cavity is the blastopore or mouth-opening. The cavity itself is the archenteron or primary stomach."

The "blastosphere" which undergoes the process of "invagination" consists of a hollow, spherical-shaped membrane, containing the segmentation cells lying side by side, so that the membrane is only one cell in thickness. Of these cells *one*—the *germ-cell—is the parent of all the others.* But the cells forming one side of the sphere are in *especial the children of the first child* of the parent germ-cell, and consist of nutritive or—as they are often termed—vegetative cells ; while the opposite side is formed of cells, which are in especial the children of the *parent germ-cell*, and are often called animal cells. The vegetative cells form the endoderm or internal germinal layer ; the animal cells form the ectoderm or external layer. The mode of origin of these two layers we have already considered. With the origin of the mesodermic or middle layer we are not at present concerned.

CHAPTER XXV.

FORMATION OF GASTRULA BY CONSCIOUS ACTION OF CELLS.—MUTUAL SERVICE BETWEEN PATRIARCH AND ITS CHILDREN.

How does the hollow blastosphere transform itself into a gastrula? How is "one half" of the blastosphere "pushed in" towards the other half?

Let us take a hollow ball of india-rubber, which shall represent for us the spherical blastosphere. The hollow of the ball will represent the "segmentation cavity." One half, or side of the ball, will represent the "animal" cells, and the other half, or opposite side, will represent the "nutritive" cells. The substance of the ball will represent the layer of cells, which is one cell in thickness.

If the "nutritive" side be pressed inwards until it touch with its whole interior surface the opposite or "animal" side of the sphere, the result will be that the "sphere," which was only one cell in thickness, will now have the form of a *hemisphere* or *cup*, the cup being *two cells* in thickness. If the whole of the surfaces of the two sides of the cup touch, the "segmentary cavity" will be obliterated; if they do not, there will still be a segmentation cavity—more or less diminished, as the case may be. If we now press towards one another the edge of the "nutritive" side of the cup and the edge of the "animal" side of the cup till they touch and unite, we shall have an elongated hollow form, with somewhat conical-shaped ends, one of which is not completely closed, a small opening being left. In some

cases of "invagination" the closure is complete, but an opening appears afterwards.

The "invagination" is now complete. The blastosphere is transformed into a gastrula.

The new hollow, formed by the invagination and succeeding union of the edges of the transformed blastosphere, is the enteron, the stomach, the gaster. The small opening is the mouth. The outer of the double layer is the ectoderm, or layer of animal cells; the inner layer is the endoderm, or layer of vegetative cells.

What is the cause of this process of "invagination"—a process which is believed to be universal with metazoa?

Our recognition of the great fact that every cell is capable of being conscious, and that Evolution is fundamentally psychological, enables us, I think, to answer that question without difficulty.

In the case of the highly developed unicellular protozoon, the *medullary nutritive layer* supplies the *corticate animal layer* with *food.* In the multicellular metazoon, the parent germ-cell enclosed in the yolk-sac is of a certain magnitude. That yolk-sac, as its name implies, contains a certain amount of organised food-matter. When the first multiplicative division takes place, there are two lives where before there was only one; *but there is no increase in the protoplasm, and food materials: they* do not "multiply," but remain as before, and the sum of the physical contents of the cell is, when the first reproduction takes place, more or less equally divided between the parent and the child. As multiplicative division proceeds, as each successive parent has to part with *half* its physical substance to its child, the cells must necessarily become smaller and smaller, until the whole of the food-substance and protoplasm have been appropriated. *The larger portion, however, has gone to the nutritive cells;* which, as we have seen, do not divide so rapidly or so often as the *animal cells,* consequently they are larger and fewer than the animal cells, and possess a

considerable amount of food-substance, which, under the circumstances, *they do not have to expend in action.* The blastosphere, being completely formed, consists on one of its sides of animal cells, and on the opposite side consists of nutritive cells ; consequently *there is a line of junction, at which a line of nutritive cells is in contact with a line of animal cells,* which, as the function of the medullary or nutritive cells is to provide organised food-material for the animal cells (and themselves, of course), the line of animal cells which are in contact with the nutritive cells *begins to absorb such food-materials.* Under the influence of the desire for food the lines of animal cells immediately behind the cells in contact with nutritive cells press forward to bring themselves in contact with the nutritive cells. The third line of cells presses over the second line, the fourth over the third, and in a very short time the process of "invagination" is complete, and the gastrula is formed. Our object being to reach a principle of action, not to classify, we need not concern ourselves with the endless modifications of the process just described.

We may be sure that the position of the parent-cell is at the mouth of the gastrula; for, although it has surbordinated its children to itself and to its service, *that service has to be paid for.* In the procuring of food for the whole organism, and in the satisfaction of its own special desires, it expends the forces of its ectoderm animal children, which have to be recuperated by the food-products of the labour of its nutritive endoderm children ; who, in their turn, have to be supplied by their parent with substances which they have to manufacture in special ways for the support of themselves and their animal brethren and of the parent cell itself. The parent is not only the "master" of all its children, but is also their "servant." In the beginning of our study of Evolution, we perceived in the unicellular protozoon the presence and necessary increase by Evolution of the principle *of universal selfishness.* In the multicellular

metazoon the relations of father and children, of master and servants, and their mutual service, we perceive the presence of the fundamental principle of *Justice*, out of which we shall, hereafter, see emerge that of which justice is the foundation—Love, Goodness. For justice is a debt. Justice *pays* what it owes, but Love—*Gives*.

CHAPTER XXVI.

EFFORTINGS TO SATISFY DESIRES CAUSE SPECIAL STRUCTURING AND FUNCTIONING.—DIVISION OF LABOUR; UNION OF LABOUR.

In his article on animal physiology in the *Encyclopædia Britannica* (p. 14) Professor Foster contrasts the life of a unicellular amœba or "lobosan" with that of the more complex, but yet still simple example of one of the lower multicellular organisms—the hydra or fresh-water polyp. He writes :—

"Leaving out certain details of structure which need not concern us now, we may say that the hydra consists of a large number of units or cells firmly attached to each other, each cell being composed of protoplasm, and in its broad features resembling an amœba. The polyp is, in fact, a group or crowd of amœba-like cells so associated together that not only may the *material* of each cell, within limits, be interchanged with that of neighbouring cells, but also the *dynamic events* taking place in one cell, and leading to exhibitions of energy, may be similarly communicated to neighbouring cells, also within limits. These cells are arranged in a particular way to form the walls of a long tubular sac of which the body of a hydra practically consists.

"They form two layers in apposition, one an internal layer, called the *endoderm*, lining the tube, the other an external layer, called the *ectoderm*, forming the outside of the tube.

"The *ectoderm cells together* constitute a *tissue* whose function in the modern sense of the word is *movement and feeling*, and the *endoderm cells* constitute a second 'tissue' whose function is *assimilation, and the phenomena of the whole body are the result of the concurrent working of these two functions*. . . . The performances of the being are conditioned by its being moulded in the form of a *long tubular sac with a crown of like tubular 'arms'* [or feelers or tentacles]; but beyond this the explanation of every act of the hydra's life is first to be sought in the characters of the endoderm and ectoderm. The physiology of the hydra is, for the most part, a series of problems, dealing on the one hand with the intimate nature of the ectodermic protoplasm, and the *changes* in that protoplasm *which give rise to movement and feeling*, as well as with the *laws whereby those changes are so regulated that 'movement' and 'feeling' come and go as the needs of the organism may require*, and on the other hand with the intimate nature of the endodermic protoplasm and the changes in that protoplasm whereby the dead food is, also according to the needs of the economy, transformed into living substance.

"The physiology of the higher animals, including man, is merely a development of the simpler physiology of the hydra, *which has been rendered more complex by a greater division of physiological labour, entailing greater differentiation of structure*, and been varied by the intercalation of numerous mechanical contrivances."

Page 15.—"In this way the simple ectoderm of the hydra is replaced by a complicated system composed of organs, some of them of extremest intricacy. But the whole system may be reduced to two sets of factors. On the one hand, there are organs in the old sense of the word—that is, mechanical arrangements—some connected with the muscles and others connected with the sensory cells,—organs whose functions have, for the most part, to be interpreted on mechanical principles, since their most important factors—

putting aside intervening muscular and nervous elements —are the inert products of protoplasm doing simple mechanical work. On the other hand, there are organs in the later sense of the word—namely, 'sensory' cells *differentiated* to be sensitive to special influences, 'central nervous' cells *differentiated* to carry on the inner nervous work, 'muscles' *differentiated* to contract, and nerves *differentiated* to bind together these three other factors. The work of these latter organs is dependent on the nature of their protoplasm,—mechanical arrangements play but little part in them; *and the results of their activity can in no way be explained on mechanical principles.*"

Page 17.—"The master tissues and organs of the body are the nervous and muscular systems, the latter being, however, merely the instrument to give effect and expression to the motions of the former. All the rest of the body serves simply either in the way of mechanical aids and protection to the several parts of the muscular and nervous systems, or as a complicated machinery to supply these systems with food and oxygen, *i.e.* with blood, and to keep them cleansed from waste matters throughout all their varied changes."

All things seem, therefore, to be the servants of the muscles and the nerves, and the muscles are also the servants of the nerves, and the nerves themselves are the servants —of what? They are the servants of that Ego of which we are in search.

How may these differences of function be supposed to arise?

In the unicellular organism all the functions of nutrition and all the functions of feeling and movement are necessarily performed by the one cell of which the organism consists. I have expressed my belief that the development of the unicellular organism is the result of increased command of the Life over its protoplasm; evidenced by its "differentiation," "specialisation," "functionisation," *of*

particular portions of its protoplasm for particular purposes, the purposive efforting of the Life to satisfy particular desires being the *cause* of such differentiation, specialisation, functionisation. In the higher grade of the Protozoa —the Corticata, we have seen that the outer substance or cortex of a ciliate protozoon is devoted to the functions of movement and feeling, while the inner or medullary portion is devoted to the functions of assimilation and nutrition. Although, being unicellular, it cannot divide itself into two layers of cells, yet it does what is as far as possible equivalent to such division: it divides its whole substance into two layers—the cortical and the medullary; which, I think, enables us to understand how the change from the unicellular protozoon to the multicellular metazoon, or enterozoon with its divisions of the parent germ-cell into the two primary germinal layers, was effected.

Psychological purposive efforting by the protozoon to satisfy its desires leads to increased specialisation of parts of its protoplasm, which necessarily leads to extension of surface and consequent increase of sensitiveness; increased sensitiveness leads to increased desires; increased desires lead to increased efforting and to increased differentiation, specialisation and functionisation of parts of its protoplasm—in other words, to a gradually increasing "division of labour" —until at last, the whole of its protoplasm being, as it would seem, as far differentiated and specialised as under the circumstances is possible, further "division of labour" cannot be effected; and thus, I think, by causes and processes of sex-aggrandisement in two opposite cells already described—all of which are to be attributed to *the efforting of the Life to satisfy its desires*, leads to the origination of the compound duo-sexual cell by the fusion of the two uni-sexual pronuclei—contributed by two uni-sexual cells—with its possibilities of indefinite increase of power and consequent development or Evolution.

In the formation of "colonies" by unicellular protozoon we observe the first faint indications of a desire on the part of the parent-cell of the colony to subordinate its children to its own service.

In the multicellular metazoa we find that desire developed and more or less satisfied; such satisfaction being, I think, attained through the increase of power possessed by the compound cell. In the multicellular-unicellular organism called a colony or plasmodium all the units composing the "colony" are the children of the first or parent cell, and remain connected with it. But they are not its servants; they are not "subordinated" to its service. Each can exist apart; each can supply its own wants. But in the multicellular organism to which the powerful compound duo-sexual germ cell gives origin *every cell remains permanently connected with the parent and subordinated to its service.* As we rise in the scale the dependence of the child-cell upon the parent germ-cell becomes more and more pronounced, until at last the dependence is complete, for severance from the parent organism means death.

CHAPTER XXVII.

THE "EGO" OF AN ORGANISM IS THE SOUL INHABITING THE PATRIARCH PARENT GERM-CELL.

At the commencement of the last chapter (the twelfth) of his wonderful work on the Functions of the Brain, "The Hemispheres considered Physiologically," Professor Ferrier writes (p. 424) :—

"Hitherto we have considered the brain chiefly in its *physiological* aspects, and the conclusion has been arrived at that the hemispheres consist of a system of sensory and motor centres. . . .

"That the brain is the organ of the mind is a universally admitted axiom. We have no proof of subjectivity or modifications of consciousness apart from the action of the cerebral hemispheres."

If the brain is the "organ of the mind," what and where is that "mind"?

That "we have no proof of subjectivity or modifications of consciousness apart from the action of the hemispheres," I hope the reader will consider to be an erroneous statement, seeing that every cell is capable of being conscious.

At page 466, Professor Ferrier writes :—

"A comparative study of the relative development of the frontal lobes in different orders of animals renders it abundantly evident that they reach their highest development in man. And the investigations of Huschke, Rudolph Wagner, etc., show that in different races, and in different individuals of the same race, there are great differences in

the development of the frontal lobes—a greater development characterising those possessed of the highest powers."

Page 467.—"We have therefore many grounds for believing that the frontal lobes, the *cortical centres* for the head and ocular movements, with their associated *sensory centres*, form the substrata of those psychical processes which lie at the foundation of the higher intellectual operations. It would, however, be *absurd* to speak of a *special seat of intelligence or intellect in the brain. Intelligence and will have no local habitation distinct from the sensory and motor substrata of the cortex generally.* There are centres for special forms of sensation and ideation, and centres for special motor activities and acquisitions, in response to and in association with the activity of sensory centres; and these in their respective cohesions, actions and interactions form the substrata of mental operations in all their aspects and in all their range."

If this be the case, it would seem that there is no special Ego, no I, no personality, no individuality; and it is incorrect for any one ever to use the word "*I*"—no one can say, "Alone I did it," but *together—we* did it; which gives rise to the question, How are all the cortical cells of the brain, and other parts of the cerebro-spinal axis which take part in a particular action, or a particular thought or series of actions and thoughts, so correlated to and with each other as together to produce the desired effect? and who or what is it, or are they, who *desire* the "effect"? If there is no "I" to correlate the cells and their action, *how are* they correlated? and how does one cell *know* what another cell desires? That every cell in the human body is directly or indirectly connected with every other cell by that wonderful system of "commissural" fibres or nerves the tracing of which is the despair of anatomists, does not *account* for correlated action, but merely makes correlated action *possible.* If I desire to move my arm—but I must not say "I"—but if we, you, they, simultaneously desire to move our, your, their,

arm, how does it come to pass that we "simultaneously desire" to do so? Leibnitz's doctrine of pre-established harmony could alone account for it; or perhaps consideration of the parent germ-cell and its relations to its children may give some clue to a solution of the problem.

The parent or patriarch germ-cell, having been formed by the fusion of the male and female pronuclei, soon afterwards begins to reproduce—to multiply first, that is, and then to divide.

So long as the germ-cell does not divide, every one will admit that it must be a single cell—an individual, and, being capable of being conscious—a person. When the cell divides, it—according to the current theory—*loses* its individuality, if it ever had any, and gives rise, by a mere mechanical division, to two asexual cells; and these cells and their products, and the products and *their* products repeat the operation, which results in a certain number of cells. Such being the case, there would seem to be nothing in the mass which can, with any show of correctness, be called an Ego, an I; and, consequently, we have the statements made by Professor Ferrier; and science seems to contradict the universal feeling of mankind, which, however, in spite of science, continues to speak as *if* each man was an individual, an Ego, an I.

I think, however, that the "contradiction" is only seeming, not real. When Dr. Ferrier says, "It would, however, be absurd to speak of a *special seat* of intelligence or intellect in the brain: intelligence and will have no local habitation distinct from the sensory and motor substrata of the cortex generally"—I agree with him, only I go farther in the same direction; for as every cell—or, more correctly, every soul inhabiting every cell is capable of being conscious, and therefore capable of intelligence, there can be no *special seat* of intelligence either in the brain or in any other part of the body, seeing that mind is everywhere present in it. But at the same time, though there is no

special seat of intelligence—seeing that every cell is intelligent—I think there *is* a "*seat*" *of special intelligence*, and that such special intelligence is the patriarch parent germ-cell of the organism.

I think that the life present in that first cell, that patriarch parent germ-cell, is the Ego, the I, of the organism, and that all the other cells—each of which is inhabited by its own Ego or life or soul—are its children, and also its servants, and all remain connected with it. I think that the Ego, the patriarch, develops itself in the *using* of its children for the satisfaction of its desires, and that its children are developed in *ministering* to such satisfactions, and also to their own as well; that there is no essential difference between the patriarch-Ego and any of its children, but only difference in degree of development; that there is no special seat of intelligence, but there *is* the seat of a special intelligence, of that most highly developed of the souls of the organism, the patriarch parent-soul, and that that soul is the Ego, the I, the me, the self, the myself. It is *prior tempore, prior jure*,—"First in time, first in right;" first come, first "served."

CHAPTER XXVIII.

ANSWERS TO PREVIOUS QUESTIONS RESPECTING ORIGIN OF BODY AND SOUL, AND THEIR RELATIONS.—SACRIFICE.

WILL the investigations we have made, and the conclusions to which they have led, enable us to answer the questions propounded by myself at page 42; where I write—

"We speak of the 'man' as the I—the Ego—the soul—the mind—the spirit. But when we use those terms, what is it we precisely mean by them? Are they three entities, or only one? And are they all three—supposing we think there *are* three—are they each and all different from what we call 'Life,' or are they only modifications or states or phases or developments of life?"

I think the evidence I have adduced shows clearly that the I, the Ego, the soul, the mind, the spirit, are only different names for the power Life in different stages of development, and that what we call the "soul" indicates that state of the Life in which feeling or sensation predominates; while the term "mind" indicates that the ability to think has been more or less developed: the great element of the soul's psychological development being the gradual acquirement of the ability to remember past sensations, to imagine new combinations of things, and to think. What the term "spirit" means we are not yet in a position to consider.

"If we suppose body and soul—supposing there *is* a soul—are different things, and that the soul is only the inhabitant of the body, then we want to know whether they came into existence simultaneously, or in succession! If in

succession, then we want to know how long the body exists before the soul takes up its residence therein; and also from whence the soul comes?"

The body exists before the soul, for the soul is born within the protoplasm of the parent, which is the "body" of the parent. When the parent, which is duo-sexual, reproduces its like—when it gives birth to a child, to a new life, a new soul—the parent parts with a portion of its body to its child, and this constitutes the "body" of the child.

When the terms "soul" and "body" are used, and questions concerning them are propounded, the word body is used as if the body of a man was a unit—which indeed it is, in one sense—and as if the "man" consisted of only one soul and one body, instead of being an aggregate of millions of souls and bodies; for in each and every individual cell or "body" of these millions there exists a "Life"—a "soul." That particular soul, which we mean when we speak of the I, the Ego, is the germ-cell, the *patriarch parent-soul*, of which all the other souls are the children and servants, but which differ from that patriarch Parent-Ego only in their lesser development.

"If we further suppose that, in addition to the body and the soul, there is another something which we designate as 'spirit' or 'mind,' we also want to know where *it* comes from, and when *it* makes its appearance. We also want to know whether other animals beside man possess souls, and also whether *they* possess minds; and whether there is any difference between the souls and minds of animals—supposing we suppose them to be possessed by animals—and the souls and minds of human creatures?

"If, in order to reduce the number of these difficulties, we suppose Soul and Life to be interchangeable terms, then we cannot avoid the inference that all living existences must have souls—even plants!"

To that part of the question respecting the origin of body, soul and mind, and their primary relations, I have already

given an answer. Respecting plants, I answer that in every cell of every plant there is present a soul, differing from the soul of the parent Ego-soul of man only in development. When God created the first soul, and manufactured—"manufactured," not "created," for it was organised out of the inorganic elements already in existence—manufactured a "body" of protoplasm, an "inner" environment, by means of which the soul should be acted upon by the "outer" environment by which it was surrounded, and to be the instrument through and by means of which the soul should, in turn, act upon its outer environment, that cell must have been a vegetative cell—but capable of developing the animal cell—for, excepting the organised protoplasm, in the midst of which that first soul was placed, there existed only unorganised mineral and gaseous substances, which the animal cell is unable to convert into food, and, therefore, must have perished; while the vegetative cell is able to convert such mineral and gaseous substances into food, not only for itself, but also for the whole of the animal world. The whole of the plant world is thus subordinated to the service of the animal world.

Must we say it is not only "subordinated" but *sacrificed* to the "service" of the animal world?

It would seem that Service, either with or without payment, either voluntary or compulsory, is the universal condition of development, of Evolution.

If it be compulsory service, and without adequate payment, we have sacrifice and injustice, the degree of injustice being determined by the amount of injury and pain inflicted.

If the service be adequately paid for, we have justice, for justice pays what it owes.

If the service be voluntary and without payment, we have self-sacrifice, we have love and goodness—which are synonymous terms—for love and goodness give, the amount of goodness and love being determined by what the gift *costs* the giver.

succession, then we want to know how long the body exists before the soul takes up its residence therein; and also from whence the soul comes ?"

The body exists before the soul, for the soul is born within the protoplasm of the parent, which is the "body" of the parent. When the parent, which is duo-sexual, reproduces its like—when it gives birth to a child, to a new life, a new soul—the parent parts with a portion of its body to its child, and this constitutes the "body" of the child.

When the terms "soul" and "body" are used, and questions concerning them are propounded, the word body is used as if the body of a man was a unit—which indeed it is, in one sense—and as if the "man" consisted of only one soul and one body, instead of being an aggregate of millions of souls and bodies ; for in each and every individual cell or "body" of these millions there exists a "Life"—a "soul." That particular soul, which we mean when we speak of the I, the Ego, is the germ-cell, the *patriarch parent-soul*, of which all the other souls are the children and servants, but which differ from that patriarch Parent-Ego only in their lesser development.

"If we further suppose that, in addition to the body and the soul, there is another something which we designate as 'spirit' or 'mind,' we also want to know where *it* comes from, and when *it* makes its appearance. We also want to know whether other animals beside man possess souls, and also whether *they* possess minds; and whether there is any difference between the souls and minds of animals—supposing we suppose them to be possessed by animals—and the souls and minds of human creatures ?

"If, in order to reduce the number of these difficulties, we suppose Soul and Life to be interchangeable terms, then we cannot avoid the inference that all living existences must have souls—even plants !"

To that part of the question respecting the origin of body, soul and mind, and their primary relations, I have already

given an answer. Respecting plants, I answer that in every cell of every plant there is present a soul, differing from the soul of the parent Ego-soul of man only in development. When God created the first soul, and manufactured—"manufactured," not "created," for it was organised out of the inorganic elements already in existence—manufactured a "body" of protoplasm, an "inner" environment, by means of which the soul should be acted upon by the "outer" environment by which it was surrounded, and to be the instrument through and by means of which the soul should, in turn, act upon its outer environment, that cell must have been a vegetative cell—but capable of developing the animal cell—for, excepting the organised protoplasm, in the midst of which that first soul was placed, there existed only unorganised mineral and gaseous substances, which the animal cell is unable to convert into food, and, therefore, must have perished; while the vegetative cell is able to convert such mineral and gaseous substances into food, not only for itself, but also for the whole of the animal world. The whole of the plant world is thus subordinated to the service of the animal world.

Must we say it is not only "subordinated" but *sacrificed* to the "service" of the animal world?

It would seem that Service, either with or without payment, either voluntary or compulsory, is the universal condition of development, of Evolution.

If it be compulsory service, and without adequate payment, we have sacrifice and injustice, the degree of injustice being determined by the amount of injury and pain inflicted.

If the service be adequately paid for, we have justice, for justice pays what it owes.

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Does the existence of man cost God anything?

The means by which the plant world is subordinated to the service of the animal world; the means by which its development of its powers—which are identical in nature and equal in amount to the powers of the animal—is almost entirely prevented, are very obvious and very simple.

We have seen how the lobosan amœba which was to develop as an animal was able to move about in the water in which it lived, by means of wave-like motion of its soft flexible surface, and by the protrusion of blunt finger-like processes, and thus had a certain command over its inner environment of protoplasm, and also over the surrounding outer environment. We have seen how, as by increased sensitiveness it needed, and was able, to adapt itself more perfectly to its outer environment by "specialising," "differentiating," "variating," through its psychological purposive action in seeking the satisfaction of its desires, portions of its inner environing protoplasm, so as, by degrees, to modify the few blunt finger-like processes into numerous fine filaments, etc., by means of which it was able to capture more and better prey. We have seen the progress from the unicellular animal protozoon, which apparently differs in nothing from the unicellular vegetable protophytan, to the multicellular hydra; which we know is only one of the steps in the upward development culminating in man; and we ask, How is it that, while animal and plant begin in the same way, and in the same amœba form, the animal should lead to man, while the plant leads at the most only to flowers and trees?

As I said, the answer is very obvious and very simple. The animal cell is more or less or entirely *free to act* upon its outer environment, and to be acted upon by it. The plant cell is not. It is *imprisoned within a wall of cellulose*, which determines and almost entirely limits its possibilities of evolution to what can be effected within those walls; for

the parent-cell is unable to subordinate its children to its service, and hence they soon reach their limits of development. The plant cell is the servant of the animal cell. Will it ever be repaid for that service?

I think it will.

CHAPTER XXIX.

PSYCHO-PHYSIOLOGICAL EVOLUTION.—TENDENCY OF PHYSICAL SUBSTANCES TO EQUILIBRIUM; OF VITAL, TO SPONTANEOUS CHANGE.

WE have seen, then, that the I, the Ego, the soul, the mind, the spirit, are only different names for Life in different states of development. The *Life*, which inhabits a particular cell, whether in amœba, sponge, star-fish, worm, crab, fish, amphibian, reptile, bird, or mammal—or the highest form of mammals, a man—is fundamentally identical with all other lives. And that the body of any *individual* cell consists of, and is limited to, the particular mass of protoplasm, in the midst of which that particular Life exists.

What we usually think of as the "body" of any given multicellular animal in reality consists of a parent or patriarch-cell, and its subordinated children.

Before we venture to attempt to answer the question of questions, "Why does man exist?" it will be necessary to inquire how the children of a given parent, or patriarch, or Ego have been subordinated to its use, and some of the special relations existing between them.

The first faint indication of subordination is to be found in the formation of "colonies" in the protozoa. For in a colony—though there might seem to be no subordination whatever—nevertheless, seeing that one particular cell of the colony is the parent of all the others, and must therefore have some infinitesimally *greater amount of experience*

than any other member of the colony, and have exercised some little influence over the others, which are its *children.* And we must never lose sight of the fact that every unicellular organism possessed that constitution and capabilities which enabled it in its individual person to perform the functions of nerve cell, muscle cell, gland cell, connective-tissue cell, liver cell, cartilage cell, bone cell ; and also of so developing itself that a given cell when forming part of a multicellular organism should, by degrees, be able to devote itself more and more exclusively *to the performance of a single one of these functions*, till in the end it could perform *only that one*—except in so far as the performance of any other than its " special " function should be necessary to its existence : this " specialisation " and " functionation " being contingent upon its being helpful to the satisfaction of the desires of the parent Ego and of its own desires.

The first great perceivable differentiation or specialisation was in the *corticated* protozoa, where we found the protoplasm of the cell-body " permanently differentiated into two 'layers'—an *outer* denser cortical substance and an *inner* more fluid medullary substance ;" the ultimate cause of such differentiation being psychological, being efforting to satisfy desires. From these two layers we deduced the origin of the division of the cells of the blastosphere formed by the " segmentation " of the compound germ-cell, into ectoderm or animal cells, and endoderm or vegetative cells ; the cause of the invagination of the blastula and the formation of the germinal layers ; the passage from the unicellular to the multicellular organism, from the protozoa to the metazoa or enterozoa.

In his eloquent description of the hydra, Professor Foster says (page 14) :—

"The physiology of the higher animals, including man, is merely *a development of the simpler physiology of the hydra*, which has been rendered more complex by a greater "division of physiological labour," entailing greater

"differentiation of structure," and been "varied by the intercalation of numerous mechanical contrivances."

At the close of the description, I wrote :—

"All things seem, therefore, to be the servants of the muscles and the nerves, and the muscles are also the servants of the nerves, and the nerves themselves are the servants —of what ?" They are the servants of that Ego of which we have been in search.

I hope the reader will conclude, with myself, that that Ego is the Parent Life of the sum of Lives constituting any and every multicellular organism ; that the word "Life" is interchangeable with "soul," "mind," "spirit" ; and that *the fundamental cause of Evolution is Psychological—that is, it is the consequence of universal purposive efforting to satisfy desires.*

"The physiology of the higher animals, including man," being "merely a development of the simpler physiology of the hydra," how has that wonderful development been effected ?

Darwin and Wallace and their fellow-workers having so admirably worked out Evolution considered from the more physiological standpoint, it will not be necessary—except incidentally—to consider that process. We will confine ourselves to what may be termed psycho-physiological Evolution.

The fundamental psychological elements are—The desires of the Patriarch-Parent-Ego, and the desires of the Egos of each of its subordinated children.

In order that a soul may exist in those relations to the physical world of which we have experience, it is necessary that it should have an environment of a very special nature. That special arrangement of material substances we call protoplasm and its organised products. In the soul's action upon the physical world exterior to its protoplasm, which constitutes its "outer environment," parts of its inner environment of protoplasm and its organised products

are lost or wasted away either through decompositions of masses or decomposition of molecules. If the soul is to continue to be able to exist in the world of which we have knowledge, it necessarily follows that when loss by decomposition occasioned by the soul's action through its inner environment of protoplasm and its organised products upon its outer environment of things occurs, such loss must be made good. If it is not made good, the inhabiting soul can no longer exist in it, and quits it. The cell is then said to "die," the meaning of "death" being that the soul which inhabited a given mass of organised substance or protoplasm has quitted that organism.

Such loss—when it is made good—has to be made good by the action of the soul itself. It must take into its remaining inner environment or protoplasm certain substances from its outer environment which, by the action of the soul or Life upon its protoplasm are converted or organised into new protoplasm.

But it is not every substance present in the outer environment that can be so converted, but only certain particular substances, and these special substances have therefore to be selected or chosen, and all others rejected. In order to make such a selection, it must necessarily be capable of being conscious; and, also, the nature and constitution of the inhabiting soul must at the beginning have been such that, when a portion of its protoplasm through its own action—as in moving itself from one place to another—has been disorganised and lost, it must have *felt* the need to replace it. It must also have been so constituted that, when it came in contact with fitting substances, they must have excited in it a desire to take them into itself, and, when taken in, to begin to act upon them, and by certain processes, first of decomposition and then of recomposition, to finally convert them into protoplasm, and to convert portions of its protoplasm into organised substances.

This "need" to have such substances as the soul can use

to replace lost protoplasm being the condition of continued existence, we can well understand how it is that hunger arises, and that its satisfaction is the most imperious of all needs and the primary cause of the soul's action.

The Mechanical theory of Life believes that all that has just been described, and which I have attributed to the psychological action of the soul conscious of need and desiring to satisfy such need, can be accounted for by physical action alone, and that the soul is an imaginary and not needed factor.

I have, in the previous part of this work, shown that such an assertion cannot successfully be sustained.

In his "Science and Culture" (page 346), Mr. Huxley, speaking of those who think that it can be sustained, writes :—

"Others, . . . seeing that the actions called 'vital' are, so far as we have any means of knowing, *nothing but changes of place of particles of matter*, look to molecular physics to achieve the analysis of the living protoplasm itself into a molecular mechanism. If there is any truth in the received doctrines of physics, that contrast between living and inert matter on which Bichat lays so much stress does not exist."

As I have previously shown, non-living matter cannot—however complexly and wonderfully arranged—be anything but *non-living* matter. Protoplasm never lives. It is only a wonderful arrangement of matters ; but an arrangement for which none of the forces belonging to matters, or any, or all of them, or any actions and interactions of them, can account. It is not the *arrangements* of particles of matter as protoplasm that troubles us, but *what it is* that so *arranges* them, *what it is* that *causes* the "changes of place." Hear what Mr. Huxley himself says on the subject.

In "Lay Sermons and Reviews" (page 73), Mr. Huxley writes :—

"The chemist regards chemical change in a body as the

effect of the action of *something external* to the body changed. A chemical compound once formed would persist for ever if no alteration took place in surrounding conditions.

"But to the student of *Life* the aspect of nature is reversed. Here incessant, and so far as we know, spontaneous change is the rule, rest the exception—the anomaly to be accounted for. Living things have no inertia, and tend to no equilibrium.

"Imagine a vessel full of water, at the ordinary temperature, in an atmosphere saturated with vapour. The *quantity* and the *figure* of that water will not change, so far as we know, for ever.

"Suppose a lump of gold to be thrown into the vessel, motion and disturbance of figure, exactly proportioned to the momentum of the gold, will take place. But after a time the effects of this disturbance will subside—equilibrium will be restored, and the water will return to its passive state.

"Expose the water to cold—it will solidify; and in so doing its particles will arrange themselves in definite crystalline shapes. But, once formed, these crystals change no further.

"Again, substitute for the lump of gold some substance capable of entering into chemical relations with the water —say a mass of that substance which is called 'protein,' the substance of flesh—a very considerable disturbance will take place, all sorts of chemical compositions and decompositions will occur; but in the end, as before, the result will be the resumption of a condition of rest.

"Instead of such a mass of dead protein, however, take a particle of *living* protein—one of those minute microscopic living things which throng our pools, and which are known as Infusoria; such a creature, for instance, as an Euglena [a "corticate" protozoon]—and place it in our vessel of water. It is a round mass provided with a long filament, and, except in this peculiarity of shape, presents no appreciable physical

or chemical difference whereby it might be distinguished from the particle of dead protein.

"But the difference in the phenomena to which it will give rise is immense. In the first place, it will develop a vast quantity of physical force—cleaving the water in all directions with considerable rapidity, by means of the vibrations of the long filament or cilium.

"Nor is the amount of chemical energy, which the little creature possesses, less striking. It is a perfect laboratory in itself, and will act and react upon the water and the matters contained therein, converting it into new compounds resembling its own substance, and at the same time giving up portions of its own substance which have become effete.

"Furthermore, the Euglena will increase in size; but this increase is by no means unlimited, as the increase of a crystal might be. After a certain time it divides, and each portion assumes the form of the original, and proceeds to repeat the process of growth and division.

"Now, so far as we know, there is no natural limit to the existence of the Euglena, or of any other living germ. A living species once launched into existence tends to live for ever.

"Consider how widely different this living particle is from the dead atoms with which the physicist and chemist have to do.

"The particle of gold falls to the bottom and rests; the particle of dead protein decomposes and rests;—but the *living* protein mass neither tends to exhaustion of its forces, nor to any permanency of form, but is essentially distinguished as a disturber of equilibrium so far as force is concerned, as undergoing continual metamorphosis and change, in point of form.

"*Tendency to equilibrium of force and to permanency of form, then, are the characters of that portion of the universe which does not live—the domain of the chemist and physicist.*

"*Tendency to disturb existing equilibrium—to take on forms which succeed one another in definite cycles—is the character of the living world.*

"What is the cause of this wonderful difference between the dead particle and the living particle of matter, appearing in other respects identical? That difference to which we give the name of Life?

"I, for one, cannot tell you. . . . This *spontaneity of action*—if I may use a term which implies more than I would be answerable for—which constitutes so vast and plain a practical distinction between living bodies and those which do not live, is an ultimate fact; indicating, as such, the existence of a broad line of demarcation between the subject-matter of biological and that of all other sciences.

"For I would have it understood that this simple Euglena is the type of *all* living things, so far as the distinction between these and inert matter is concerned. That cycle of changes which is constituted by perhaps not more than two or three steps on the Euglena, is as clearly manifested in the multitudinous stages through which the germ of an oak or a man passes. Whatever forms the Living Being may take on—whether simple or complex—*production*, *growth*, *reproduction*, are the phenomena which distinguish it from that which does not live.

"If this be true, it is clear that the student, in passing from the physico-chemical to the physiological sciences, enters upon a *totally new order of facts*."

CHAPTER XXX.

BOUNDLESS POSSIBILITIES OF EVOLUTION; VARIATIONS IN CELLS OCCUR BETWEEN BIRTH AND REPRODUCTION.—HEREDITY.—NEW SPECIES.

To this "new order of facts" must, I think, be added the further fact that, as life cannot be accounted for by any or all of those powers which constitute what we call matters, or by their actions and interactions, we have no choice but to believe that Life was a *new Power added* to those previously existing by an act of Creational causation; a power possessing the ability to "override," to a certain extent, the actions of the material powers, and *able, like the material powers, to express itself as force*, capable of being conscious, capable of desires, capable of efforting to satisfy those desires, and through that efforting to reach, though by slow steps, that height of psychological and physiological Evolution, to which we give the name—man.

To what greater heights it may yet attain—even in this world—we know not; but all analogy would seem to warrant the inference that the soul's progress in knowledge and goodness will be without limit. The study of the phenomena, which have presented themselves during our study of the present subject, suggests the most tremendous possibilities. We have seen how limited has been the development of the simple unicellular duo-sexual cell, as expressed in the highest form of the corticate protozoon. We see how great has been the development of the compound duo-sexual cell as expressed in the multi-

cellular organism—man. The difference is so great that, were it not that science has traced for us the steps by which such difference has been reached, belief that the one is no more than the development of the other would be impossible. With the compound duo-sexual cell commences that subordination of its child-cells by the parent-cell, which has been so great a factor in evolution. The new compound cell arose out of the union of two simple cells, each of which had had one of its sex modes of action diminished and finally destroyed, but resulting in the great aggrandisement of its opposite. Out of the compound duo-sexual cell arose the multicellular organism. The multicellular organism made the subordination of the many to the one, with all its magnificent results, possible.

Is it not conceivable that some modification of Life-phenomena, as we know them at present, which shall be as great an advance upon the compound cell as the compound cell was upon the simple cell, may hereafter take place? At the present time the total sum of knowledge accumulated by the successive labour and thought of the greatest minds, working simultaneously in different directions, has become too great to be mastered by the individual mind. The desire of the individual mind to know all that is known cannot, as we are at present constituted, be gratified, or only very imperfectly. But the cause of evolution is efforting to satisfy desires. The efforting of the amœba to satisfy its desires evolved the highest form of corticate protozoon, with its substance "differentiated" into two layers, cortical and medullary, its cuticle, its projectible filaments, its cilia, its oral aperture, its pharynx, its food vacuoles, its mode of ejecting waste matters. When it had reached this stage of development, had it evolved itself as far as was possible as a "single" cell? Was further development possible only to a cell which should have at its command *other* cells? and was the evolution of the compound cell

the result of continuous efforts to satisfy the increased desires of a soul which had become greater than *could* be satisfied without the help of other souls? I think it was; and similar causes may produce similar effects.

In the unicellular organism, the life, by means of its action upon different portions of its protoplasm, can perform all the functions necessary for the maintenance of its existence. In the multicellular organism, instead of each cell performing *all* the functions necessary to the maintenance of the existence of the organism, a cell rarely performs more than *one* of these functions—in addition, of course, to the performance of such other functions as are necessary for the maintenance of its own individual existence. Each cell is exclusively a muscle cell, a nerve cell, etc. There is Division of Labour.

How has this "Division of Labour," this change from the general to the particular, been effected? It has been effected by what we call Heredity, or the reproduction by a cell of its *like*. But it is said that the child is not always "like" its parent—indeed, may be extremely *un*like—and the saying is true. The multicellular "organism" does not always, *as a whole*, produce an organism which is in all respects like itself; and considering the millions of cells of which a multicellular organism may consist, it would be a wonder if it did. But I think the single, the individual cell, always produces a cell like itself, but only on one condition. If *no change* either of development or degeneration has taken place in the parent-cell between the time of its own birth and the time when it gives birth to a child-cell, the child-cell will be like the parent-cell. But if any change, whether of development or degeneration, *has* taken place in the parent-cell between the time of its own birth and progress to maturity, and the birth of its child-cell, such "change" will be present in the child-cell, and the child-cell will not be like what its parent-cell *was*

when its parent-cell was *born*, but will be like what its parent-cell *is* when, at *maturity*, it gives birth to its child-cell. If during growth from birth to maturity the cell should have insufficient or unsuitable food, or be exposed to injurious changes of temperature, etc., the cell will, when it reaches the time of reproduction, give birth to a feeble and degenerated child. If it is supplied with abundant and particularly nutritious food, its child may be more highly developed than itself. *A child-cell must necessarily be like what its parent-cell is at the time of reproduction.* It is the possibility of change—whether in the direction of degeneration or development—in a cell between growth and maturity (which is the time of reproduction) which, I think, enables us to understand how development and also degeneration are effected. If no change has occurred, the child-cell will be exactly like what its parent-cell was at the parent-cell's birth. If there has been change, the child-cell will not be like what its parent-cell *was* when its parent-cell was born, but will be like what its parent-cell *is* when its child-cell is born. *That every child-cell must necessarily be exactly like what its parent-cell is at the time when the parent-cell gives birth to a child-cell*, I take to be the explanation of "Heredity." That changes may occur between the time of its birth and its arrival at maturity and reproduction, I take to be the explanation of "Variation" also, for such changes *must* be present in the child-cell to which it gives birth. That no changes take place in a cell between the time of its birth and the time when it reproduces, I take to be the explanation of the absence of variation.

The principle stated above enables us, I think, to understand how differentiation, specialisation, functionation, are effected.

If the sum of the action of the desires of the patriarch-Ego of an organism and of its "subordinated" children be such that in the case of a given cell its power of contractility

is most frequently called into action, while its other powers are little used, that cell will tend to develop its contractility, *and consequently to organise an increasing portion of its protoplasm in that direction*, and to organise a less portion for other uses. Every increase in power of contractility *acquired between* the *time of its birth and the time of its reproducing* will be transmitted by the parent-cell to its child-cell, which will be exactly like what its parent was at the time of birth, but will not be exactly like its parent's parent, in whom the power of "contractility" was a *little less* developed.

By degrees the successive descendants of such cell will exhibit increasing contractility, till at length we have a cell which is entirely contractile—till we have a muscle-cell. In the case of other cells similar causes will produce similar effects; the functioning of the general cell to particular kinds of action.

The continual struggle for existence gives rise to the necessity for increased efforting to satisfy desires.

Suppose increase of speed should be needed to capture some particular kind of prey, the devouring of which gives particular pleasure, and consequently gives rise to strong desire. The mental action of the patriarch-Ego will be especially applied to the limbs and the organs of breathing, etc.; and the muscles of the limbs, and the organisms of the lungs, will receive an increased supply of blood, and consequently a larger supply of food to the cells constituting the muscles and lungs, and through increased action and increased nutrition a greater number of lung-cells and muscle-cells are likely to be born, and a "variation" may arise.

Whatever tissues or organs are frequently and specially called into action by the efforting of an organism to satisfy its desires—whether muscles, nerves, organs of sight, hearing, breathing, running, flying, wading, in pursuing something desired, or in escaping something dreaded—will tend to

increase their growth and efficiency; for every beneficial modification of each cell which may arise between the time of its birth and the time of its reproducing will be transmitted to the child-cell, and the changes which take place in a cell between the time of its birth and the time of its reproducing may, by accumulation during many generations, give rise to variations, which may give rise at last to new species.

CHAPTER XXXI.

ACTIONS AND REACTIONS BETWEEN THE PATRIARCH-EGO AND ITS CHILD-EGOS.—THE NERVOUS SYSTEM.

THE general conception of a human creature is that of a conscious soul or spirit or mind capable of feeling, perceiving, remembering, imagining, thinking, existing in some vague, indefinite, mysterious manner in a material body which lives, indeed, but is incapable of consciousness or volition; the origin of the soul, the source from whence it came, its *locale* in the body, the nature of the connection of the soul and the body, and their modes of mutual action and reaction upon each other, being alike incomprehensible and perplexing. For if the soul be considered as a spiritual indefinable entity without magnitude or parts, how could it act upon the body which is composed of matter, and how could the body act upon *it*? It would seem that spirit alone could act upon spirit, and that matter alone could act upon matter. Out of these seeming incompatibilities arose the logical inferences that on the one hand either everything was spiritual, or on the other, everything was material.

In the previous volume * I have endeavoured to show that the ultimate elements of what we call "matter"—that is, atoms—consist of groups of powers, the activities of which manifest themselves to us as force of different characters, and that Life was a new power added to the number already existing, and possessed of powers almost immeasurably,

* "Whence comes Man; from 'Nature' or from 'God'?" Isbister & Co.

superior to those which constitute atoms; that the new power Life, in addition to its ability to feel, to perceive, to remember, to imagine, to think, also possessed the ability to express itself as force; and hence is able to act upon matters, and to be acted upon by them.

What we have now to consider are the modes of mutual action and reaction of the patriarch-parent-Ego-cell, and its subordinated children, in order that, having acquired some knowledge of the true nature and constitution of what we call a human being, we may be the better able to form some opinion as to "why man exists," and to arrive at some conclusion respecting the motives and character of the Being by whom he was caused to be.

Our study of the cell as an Individual has, I hope, enabled us to arrive at certain very important conclusions. That all cells are essentially alike, and that the difference between one cell and any other cell is only a difference of development. That every cell is inhabited by a life, or soul. That every cell is capable of being conscious. That there is only one mode of multiplication—viz. sexual. That the condition of multiplication is that the cell must be duo-sexual, there being no such thing as asexual or sexless reproduction. That the passage from the unicellular to the multicellular arose out of the formation of the compound germ-cell. That a multicellular organism consists of a patriarch-parent-cell and its children. That in the unicellular organism development is consequent upon a gradual increase of the power of the Life, or Soul, or Ego, over the mass, or cell of protoplasm which it inhabits. That in the multicellular organism the condition of development is the subordination by the patriarch-parent-cell of an increasing number of its children to its own use and service. That in return for such service the parent-cell has to provide food, etc., for itself and the whole organism. That the organism constitutes a Patriarchy. That the patriarch-parent-cell is the "Ego" the "I," the "Me," the "Myself"

of the organism. That each of its children is to itself an Ego.

From the consideration of the cell as an individual we now pass to that of the organism resulting from the combined action of a number of cells, the great relation of which to one another is that of a patriarchy or government by a parent of the children which have descended from it and which remain permanently attached to it.

As our purpose is psychological and ethical, and physiological only in so far as the facts of physiology may be expected to throw light upon, and enable us to form right judgments respecting those of psychology and ethics, we will specially consider some of the phenomena of muscular and nervous action, particularly those presented in "reflex action;" inasmuch as, without a right understanding of the real nature of those phenomena, our knowledge of the nature and constitution of man must necessarily be imperfect, and many of our opinions and judgments more or less erroneous, especially in relation to psychology and ethics. We have seen that the other parts of an animal organism may be said to be the "servants" of the muscles and the nerves, or more properly of the nerve-cells, and that the muscles are the servants of the nerve-cells, and that *both* are the servants of the patriarch-Ego-cell of the organism.

The following particulars respecting the nervous system, etc., I quote from Quain's "Anatomy," vol. ii., from Professor Huxley's "Elementary Lessons in Physiology," from Professor Balfour's "Comparative Embryology," and from Professor Michael Foster's "Text-Book of Physiology."

From Quain (vol. ii., p. 137):—

"*The nervous system* consists of a *central part*, or rather, a series of *connected central organs*, named the *cerebro-spinal axis*, or *cerebro-spinal centre*; and of the *nerves*, which have the form of cords [a "cord" consists of a greater or less number of nerve-fibres, or nerves, bound up together in a single sheath] connected at one extremity

with the cerebro-spinal centre, and extending from thence through the body to the muscles, sensible parts, and other organs placed in functional relation with them. The nerves form the medium of communication between the distant parts of the centre. One class of nervous fibres termed *afferent* [or *sensory*] or *centripetal* conducts impressions *towards the centre*—another, the *efferent* [or *motory*] or *centrifugal*, carry motorial stimuli *from the centre* to the moving organs."

From Professor Huxley (page 248) :—

"The nervous apparatus consists of two sets of nerves and nerve-centres, . . . the *cerebro-spinal* system and the *sympathetic* system. The former consists of the cerebro-spinal axis [composed of the brain and spinal cord], and the *cerebral* and *spinal nerves*, which are connected with this axis. The latter comprises the chain of *sympathetic ganglia*, the nerves which they give off, and the nervous cords by which they are connected with one another, and with the spinal nerves.

"Nerves are made up entirely of nerve-*fibres*; nerve-*centres*, on the other hand, are composed of *nerve-cells* or ganglionic corpuscles mingled with nerve-fibres.

Quain (page 137) :—

"Besides the cerebro-spinal centre and the nervous cords, the nervous system comprehends also certain bodies named *ganglia*, which are connected with the nerves in various situations. These bodies, though of smaller size and less complex in nature than the *brain*, agree in some respects with that organ in their *elementary structure*, and to a certain extent also in their relation to the nervous fibres with which they are connected ; and this correspondence becomes even more apparent in the nervous system of the lower members of the animal series."

Quain (page 155) :—

"The *ganglia* differ widely in size. A section carried through a ganglion in the direction of the nervous cords

connected with it discloses collections of nerve-cells, between which the nerve-fibres pass. The nervous cords, on *entering, spread out into smaller bundles, between which the ganglion-cells are interposed*; and the fibres are *gathered up again into cords* on *issuing* from the ganglion.

"Of the relation between the nerve-fibres in a ganglion and the ganglion-cells it is probable that some fibres may pass through without being connected with the cells, but that every cell is connected with a fibre or fibres. Nerve-cells are unipolar or multipolar.

Huxley (page 249):—

"The cerebro-spinal axis lies in the cavity of the skull and spinal column or back bone.

"The spinal cord is a column of greyish white soft substance, extending from the top of the spinal canal, where it is continuous with the brain, to about the second lumbar vertebra, where it tapers to a filament. A deep fissure, the *anterior fissure*, divides it in the middle line in front, nearly down to its centre; and a similar cleft, the *posterior fissure*, also extends nearly to its centre in the middle line behind.

"In consequence of the presence of these fissures only a narrow bridge of the cord connects its two halves, and this bridge is traversed throughout its entire length by a minute canal, the central canal of the cord.

"Each half of the spinal cord is divided longitudinally into three equal parts—the anterior, lateral, and posterior columns—by the lines of attachment of two parallel series of delicate bundles of nervous filaments, the roots of the spinal nerves. The roots of the nerves which arise along that line which is nearer the posterior surface of the cord are called posterior roots; those which arise along the other line are called anterior roots. A certain number of anterior and posterior roots, on the same level on each side of the cord, converge and form anterior and posterior bundles, and then the two bundles, anterior and posterior, coalesce into the trunk of a spinal nerve; but before doing so, the

posterior bundle presents an enlargement—*the ganglion of the posterior root.*

"The trunks of the spinal nerves pass out of the spinal canal by apertures between the vertebræ, and then divide and subdivide, their ultimate ramifications going, for the most part, to the muscles and the skin.

"There are thirty-one pairs of these spinal nerves.

"Each half contains two substances—a white or medullary substance on the outside, and a greyish-red substance in the interior.

"*The white matter consists entirely of nerve-fibres.* Most of these fibres run lengthways in the cord.

"The *grey matter*, on the other hand, contains *in addition* a number of *nerve-cells*, or *ganglionic corpuscles*, some of them of considerable size. These cells are *wholly absent* in the white matter.

"Ordinary *nerve-fibres* are sub-cylindrical filaments of a clear, somewhat oily look. But shortly after death a sort of coagulation sets up within the fibre, and it is then found to be composed of a very delicate, structureless, outer membrane forming a tube, through the centre of which runs the *axis-cylinder*, which is probably composed of an aggregation of very fine filaments.

"Such is the structure of all the larger nerve-fibres, which lie, side by side, in the trunks of the nerves, bound together by delicate connective substance, and enclosed in a sheath of the same substance, called the *neurilemma.* In the 'trunks' of the nerves, the 'fibres' remain perfectly distinct from one another, and rarely, if ever, divide. But when the nerves *enter the central organs*, and when they approach their peripheral terminations, the nerve-fibres frequently divide into branches. In any case they gradually become finer and finer, until at length, axis-cylinder, sheath and contents, are no longer separable, and the nerve-fibre is reduced to a delicate filament, the ultimate termination of which, in the sensory organs, is not yet thoroughly made out.

"*Tactile corpuscles* are oval masses of specially modified connective tissue, in relation with the ends of the nerves in the papillæ of the skin. The mode in which nerves not connected with tactile corpuscles end in the skin is not yet definitely known.

"In muscles the nerve-fibre seems to pierce the sarcolemma, and to end inside the ultimate muscular fibre in a peculiar knob or plate.

"If the *trunk* of a spinal nerve be irritated in any way, as by pinching, cutting, galvanising, or applying a hot body, two things happen: in the first place, all the muscles to which filaments of this nerve are distributed, *contract*; in the second, *acute pains are felt*, and the pain is referred to that part of the *skin* to which fibres of the nerve are distributed.

"If the *anterior bundle* of root-fibres be irritated in the same way, *only half* the previous effects are brought about: that is to say, all the muscles to which the nerve is distributed *contract, but no pain is felt.*

"So again, if the *posterior ganglionated bundle* be irritated, only half the effects of irritating the whole trunk is produced. But it is the *other* half; that is to say, none of the muscles to which the nerve is distributed contract, but *intense pain* is referred to the whole area of the skin to which the fibres of the nerve are distributed.

"It is clear from these experiments that all the power of causing *muscular contraction* which a spinal nerve possesses is lodged in the fibres which compose its *anterior roots*, and all the power of giving rise to *sensation* in those of its *posterior roots*. Hence the anterior roots are commonly called *motor*, and the posterior *sensory*.

"If, in a living animal, the anterior roots of a spinal nerve be cut, the animal loses all control over the *muscles* to which that nerve is distributed, though the *sensibility* of the skin supplied by the nerve is perfect. If the posterior roots be cut, sensation is lost, and voluntary movement remains. But if *both* roots be cut, neither voluntary move-

ment nor sensibility remains. The muscles are said to be "paralysed," and the skin may be cut, or burnt, without any sensation being excited.

"If, when both roots are cut, *that end* of the 'motor' root which remains connected with the trunk of the nerve, be irritated, the muscles contract; while, if the *other end* be so treated, no apparent effect results. On the other hand, if the end of the sensory root connected with the trunk of the nerve be irritated, no apparent effect is produced; while, if the end connected with the cord be thus served, violent pain immediately follows.

"*The Brain.*—The brain—that part of the cerebro-spinal axis which is situated within the skull—is a complex organ, consisting of several parts, the hindermost of which, termed *medulla oblongata*, passes insensibly into, and in its lower part has the same structure as the spinal cord.

"Above, however, it widens out, and the central canal spreading with it becomes a broad cavity, which (leaving certain anatomical minutiæ aside) may be said to be widely open above. This cavity is termed the *fourth ventricle.* Overhanging the fourth ventricle is a great laminated mass, the *cerebellum.* On each side this organ sends down several layers of transverse fibres, which sweep across the brain and meet in the middle line of its base, forming a kind of bridge (called *pons variolii*) in front of the 'medulla oblongata.' The longitudinal fibres of the medulla oblongata pass forwards among, and between, these layers of transverse fibres, and become visible in front of the 'pons,' as two broad diverging bundles, called *crura cerebri.* Above the crura cerebri lies a mass of nervous matter raised up into two hemispherical elevations, called *corpora quadrigemina.* Between these and the crura cerebri is a narrow passage into what is termed the *third ventricle* of the brain. The third ventricle is a narrow cavity lodged between the two great masses of nervous matter, called *optic thalami*, into which the crura cerebri pass. The roof of the third ventricle

is merely membranous; and a peculiar body of unknown function, the *pineal body*, is connected with it. The floor of the third ventricle is produced into a sort of funnel, which ends in another anomalous organ, the *pituitary body*.

"The third ventricle is *closed in front* by a thin layer of nervous matter [termed the *lamina terminalis*, or the *lamina cinerea*, indiscriminately]; but *beyond* this—on *each side*—there is an aperture in the boundary wall of the third ventricle which leads into a large cavity. The latter occupies the centre of the cerebral hemisphere, and is called the *lateral ventricle*. Each hemisphere is enlarged backwards and forwards into as many *lobes*; and the 'lateral ventricle' presents corresponding prolongations or *cornua*.

"The floor of the lateral ventricle is formed by a mass of nervous matter, called the *corpus striatum, into which the fibres that have traversed the optic thalamus enter*.

"The two great masses, the optic thalami and the corpora striata, are called the Basal ganglia.

"The 'hemispheres' are so large that they overlap all the other parts of the brain, and in the upper view, hide them.

"Their applied faces are separated by a median fissure for the greater part of their extent; but, inferiorly, are joined by a thick mass of transverse fibres, the *corpus callosum*.

"The outer surfaces of the *hemispheres* are marked out into *convolutions*, or *gyri*, by numerous deep *fissures* or *sulci*. One large and deep fissure which separates the anterior from the middle division of the hemisphere is called the *fissure of Silvius*.

"In the *medulla oblongata* the arrangement of the white and grey matter is substantially similar to that which obtains in the spinal cord: that is to say, the white matter is external and the grey matter internal. But in

the *cerebellum* and *cerebral hemispheres* the grey matter is *external* and the white *internal*; while in the *optic thalami* and *corpora striata* grey matter and white matter are variously *intermixed*."

The externally situated grey matter of the hemispheres and the cerebellum is called the *cortex*.

Twelve pairs of nerves are given off from the brain.

"The functions of most of the parts of the brain which lie in front of the medulla oblongata are at present very ill understood; but it is certain that *extensive injury or removal of the cerebral hemispheres puts an end to intelligence and voluntary movement*, and leaves the animal in the condition of *a machine*, working by the *reflex action* of the *remainder* of the cerebro-spinal axis."

CHAPTER XXXII.

RUDIMENT OF CEREBRO-SPINAL AXIS.—DEVELOPMENT OF THE CEREBRAL HEMISPHERES FROM THE LAMINA TERMINALIS.

Development of the nervous system (Quain, vol. ii., p. 819):—

The Cerebro-Spinal Centre.

"The *rudiment* of the cerebro-spinal nervous centre is formed immediately from the thickened medullary plates of the involuted epiblast, the ridges of which rising from the surface of the blastoderm become united dorsally along the middle line *so as to close in a hollow medullary tube of a cylindrical form.* This tube is wider at its anterior or *cephalic* extremity, and this dilated portion becomes divided by partial constrictions, first into two, and very soon after into *three primary cerebral* or *encephalic vesicles*, which represent *anterior, middle*, and *posterior* primary divisions of the brain. The *spinal portion* retains a more uniform cylindrical shape. The continuous cavity enclosed within the primitive medullary tube is the same with that which, variously modified, afterwards constitutes the *central ventricles* of the brain and *canal* of the spinal cord."

From Balfour's "Comparative Embryology," vol. ii., p. 346:—

"*The anterior lobe of the brain becomes converted into the cerebral hemispheres*, the *thalamencephalon*, the *primary optic vesicles*, and the parts connected with them. *The middle*

lobe becomes the optic lobes (corpora bigemina, or corpora quadrigemina in mammalia) and the crura cerebri ; while *the posterior lobe* becomes converted into the cerebellum and medulla oblongata."

Page 348.—"The similarity of the primitive arrangement and histological character of the parts of the brain *behind* the cerebral hemispheres to that of the spinal cord is very conclusively shown.

"*The Hind-brain* is at first an elongated funnel-shaped tube. It forms a direct continuation of the spinal cord. The ventricle it contains is known as the fourth ventricle."

Page 352.—"*The Mid-brain.* The changes undergone by the mid-brain are simpler than those of any other part of the brain."

Page 353.—"*The Fore-brain.* In its *earliest condition the fore-brain forms a single vesicle without a trace of separate divisions,* but very early it *buds off the optic vesicles,* which become gradually constricted off from the fore-brain. They remain, however, attached to it at the anterior extremity of the fore-brain. The anterior part of the fore-brain becomes prolonged, and at the same time somewhat dilated. There shortly appears a constriction. This is shallow at first, but soon becomes much deeper, leaving, however, the cavities of the two divisions of the fore-brain united eventually by a somewhat wide canal.

"Of these two divisions the *posterior* becomes the *thalamencephalon,* while the *anterior* and *larger* forms *the rudiment of the cerebral hemispheres and olfactory lobes. For a considerable period this rudiment remains perfectly simple,* and *exhibits no signs, either externally or internally, of a longitudinal construction dividing it into two lobes.*

"From the above description it may be concluded that the *rudiment of the cerebral hemispheres is contained in the original fore-brain.*"

Page 360.—*The Cerebral Hemispheres—their Development.*

"In the 'cerebral rudiment' two parts may be distinguished—viz. the *floor* and the *roof*. The former gives rise to the ganglia at the base of the hemispheres—corpora striata, optic thalami, etc.—the latter to the hemispheres proper.

"The *first change* which takes place consists in the 'roof' growing out into two lobes, between which *a shallow median constriction makes its appearance.* The two lobes thus formed are the 'rudiments' of the two hemispheres. The cavity of each of them opens by a widish aperture into the vestibule at the base of the cerebral rudiment, which again opens directly into the cavity of the third *ventricle.* The Y-shaped aperture thus formed, which leads from the cerebral hemispheres into the third ventricle, is the foramen of Munro. The cavity in each of the rudimentary hemispheres is a '*lateral*' *ventricle.* The part of the cerebrum which lies *between the two hemispheres* and passes forward from the roof of the third ventricle round the end of the brain to the *optic chiasma* is the '*rudiment*' of the *lamina terminalis* or *lamina cinerea.*"

The *Lamina Terminalis* is the *anterior end of the primitive medullary tube, and is thus the oldest part of the whole organism.*

Seeing that I have endeavoured to prove that every multicellular organism consists of the primary parent-cell and its children, the question arises: *In what part of the organism is that parent-cell located?* If, as I have endeavoured to show, it stands in relation to all its children as not only their parent, but also to a large extent as their governor, and also uses them as instruments for the satisfaction of its desires, *it must be in such a position and have such connections with its child-cells as shall render such action upon them possible.* The special "instruments" of such action we have seen to be nerve-cells and muscle-cells. We have seen that all the other parts of the system

minister to the muscle-cells and nerve-cells, and that muscle-cells and nerve-cells and all parts of the body minister directly or indirectly to the patriarch-parent-cell, the "I," the Ego, the me, the myself, the soul, the mind, the spirit of the organism. Where is that parent-cell to be found?

CHAPTER XXXIII.

WHERE IS THE PATRIARCH-CELL SITUATED? BEING SINGLE, IT CANNOT INHABIT A DOUBLE ORGAN.

THERE are two bodies in the brain within which attempts have been made, but unsuccessfully, to localise the soul: the *pineal gland*, and the *pituitary body*.

"The *pineal body* or *gland* is a reddish body of about the size of a small cherry stone. It is connected with the posterior part of the 'third ventricle,' projecting backwards and downwards between the superior pair of *corpora quadrigemina*."—QUAIN.

At page 358, vol. ii., Professor Balfour writes:—

"No satisfactory suggestions have yet been offered as to the nature of the *pineal gland*. It appears to possess an epithelial structure, but, except in the base of the stalk in mammalia, in the wall of which there are nerve *fibres*, *no nervous structures are present in it in the adult state*.

"*The pituitary body* is a small reddish-grey mass of a somewhat flattened oval shape, and occupying the sella turcica of the sphenoid bone. Its weight is from five to ten grains. It consists of two lobes, of which the anterior is the larger, and is concave behind, where it embraces the smaller posterior lobe."—QUAIN.

At page 358, vol. ii., Professor Balfour writes:—

"The *pituitary body* is not properly a nervous body."

Page 359.—"It is clearly a '*rudimentary*' organ; . . . when functional it was probably a sense-organ opening into the mouth, its blind end reaching to the base of the brain."

In the *pineal gland* in which "no nervous structure is present," or in the pituitary body, which "is clearly a rudimentary organ," we could not hope to discover the parent-Ego.

The Lamina Terminalis consists of the end portion of the primary vesicle, from which the cerebral hemispheres take their rise.

Is the patriarch-parent-Ego situated in the grey matter of the lamina terminalis?

Professor Balfour says (page 360) :—

"The first change which takes place consists in the *roof* [that is, the *lamina terminalis*] growing out into two lobes, between which a shallow median constriction appears."

At page 361 he commences to speak of the *development* of the cerebral hemispheres.

Page 361.—"In Elasmobranchii [an order of fishes in which, instead of bones, the skeleton consists of cartilaginous substance], although the cerebrum reaches a considerable development, yet it is *not*, in many forms, *divided* into two distinct lobes, but its '*paired*' nature is only marked by a *shallow constriction* on the surface. The '*lamina terminalis*' grows backwards as a thick median septum which *completely separates* the two lateral ventricles.

"The Teleostei [fishes with a bony skeleton]. In the petromyzon the cerebral rudiment is *at first* an *unpaired anterior vesicle*, which subsequently becomes bilobed in the normal manner.

"In *all the higher vertebrates* the division of the cerebral rudiment into two distinct hemispheres is quite complete, and with the deepening of the furrow between the two hemispheres the Lamina Terminalis is carried backwards till it forms a thin layer *bounding the third ventricle anteriorly*, while the lateral ventricles open directly into the third ventricle.

"In *amphibians* the two hemispheres become united

together *immediately in front* of the "lamina terminalis" by commissural fibres, forming the *anterior commissure* [the *first-formed* commissure]. They also send out solid prolongations, usually spoken of as the "*olfactory lobes*," which subsequently fuse together."

In considering the gradual development of the cerebral hemispheres let us *suppose* the parent-Ego to be present in the "lamina terminalis."

"In all *reptiles* and *aves* there is formed an anterior commissure. The hemispheres may obtain a considerable development. Their outer walls are much thickened, while their inner walls become very thin, and a well-developed ganglionic mass, *equivalent to the corpus striatum*, is formed at its base."

May these facts be considered as evidences of increasing desires on the part of the parent-Ego seated in, and governing from, the "*lamina terminalis*," leading to development of hemispheres on the one hand, and on the other of a great motor instrument in the shape of the corpora striata?

"The cerebral hemispheres undergo in *mammalia* the most complicated development. The primitive 'unpaired' cerebral rudiment *becomes*, as in lower vertebrates, *bilobed*, and at the same time divided by the ingrowth of a septum of connective tissue into *two distinct hemispheres*.

"The hemispheres grow rapidly in size and extent, *especially backwards*, and gradually cover the thalamencephalon [the 'optic thalami,' etc., the great sensory instrument] and the mid-brain. The foramen of Monro becomes reduced to a mere slit.

"The *corpus striatum projects upwards* into each lateral ventricle, giving it a somewhat semilunar form, the two horns of which constitute the permanent anterior and descending 'cornua' [or 'horns'] of the lateral ventricles.

"The *corpora striata* are *united* at their anterior border with the *optic thalami*. In the later stages of development *the area of contact* between these two pairs of ganglia

[the great sensori-motor ganglia] increases to an immense extent, and *the boundary between them becomes somewhat obscure.*"

The reader will no doubt have observed that Professor Balfour several times speaks of organs as being "paired" or "unpaired," and of organs being divided by "constrictions" into "two lobes." At page 353 he says :—

"*Fore-brain.*—In its *earliest condition* the *fore-brain* forms a single vesicle without a trace of separate divisions, . . . and exhibits no signs, either externally or internally, of a *longitudinal constriction* dividing it into two lobes."

Page 360.—"The first change which takes place consists in the *roof* growing out into two lobes, between which a *shallow median constriction* appears.

"In *Elasmobranchii.*—Yet it is not in many forms divided into two distinct lobes, but its *paired* nature is only marked by *a shallow constriction* in the surface.

"In the *Teleostei* the cerebral rudiment is at first an *unpaired anterior vesicle.*

"In all *the higher vertebrates* the *division* of the cerebral rudiment into two distinct hemispheres is quite complete.

"In *Amphibians* the two hemispheres *become united together immediately in front of the 'lamina terminalis'* by commissural fibres forming the anterior commissure" [the *first-formed* commissure].

In considering the structure of a mammal it would at first sight seem that all its organs are "paired" or "double." We have a pair of legs, of arms, eyes, ears, hemispheres, corpora striata, optic thalami ; pairs of nerves on each side of the central canal, on each side of the ventricles of the brain. In fact, it would seem that, with perhaps the exception of the pineal gland and the pituitary body, there is no such thing as an *unpaired* or *single* organ.

From which it would seem to follow that there cannot be any single or individual personal parent-Ego : for a *single* parent-Ego cannot exist in a *pair* of organs. And the facts

of anatomy and physiology show that, if there *be* such a thing as the single parent-Ego, it cannot be located either in the "pineal body" or in the "pituitary body."

The cerebral hemispheres are spoken of as the seat, or at any rate, the "instruments" of the soul or mind; but if my postulate be correct, the "soul" certainly cannot be located in the hemispheres, for they are *paired* or *double* organs. And besides, the entire loss of *one* of the hemispheres does not entail inability to be conscious, to feel, to think, but merely renders consciousness dull and thought sluggish. Whether it be the right or the left hemisphere which is lost, or by disease has become useless, makes no difference. But, as Mr. Huxley says, "extensive injury or removal of [both] the hemispheres puts an end to intelligence and voluntary movement."

The parent-Ego, then, cannot be present in the hemispheres, unless we suppose it to be capable of migrating from one to the other—a supposition which can hardly be entertained.

If there *be* such a thing as the parent-Ego, it cannot, being single, be located in any "paired" or "double" organ; and wherever it may be situated it must necessarily be in such relations of position to the nervous system that *upon* and *to* it all sensory arrangements must, directly or indirectly, *converge*, and *from* it all motory arrangements must directly or indirectly *radiate*.

Would a cell in the midst of the "*lamina terminalis*" meet the necessary conditions?

CHAPTER XXXIV.

THE LAMINA TERMINALIS IS A SINGLE ORGAN: DOES IT CONTAIN THE PATRIARCH-EGO-CELL?

PROFESSOR BALFOUR'S remarks on the development of the cerebral hemispheres clearly show that the cerebral rudiment originates from the "*lamina terminalis*," and that in its *earliest condition* there is *not a trace of* "*separate divisions.*"

"The *first change* which takes place consists in the *roof* [the '*lamina terminalis*'] growing out into two lobes, between which a shallow median *constriction* appears."

The subject being of such great difficulty and delicacy, and of such extreme importance, it will be necessary to use our terms with the utmost possible accuracy. It seems to me that the word "constriction," as used above, is misleading. To "constrict" is to draw together, to bind, to cramp, *to draw into a narrow compass*, to contract, to cause to shrink. Now, what is above described as a "constriction" is *not a constriction at all: it is merely the space between two outgrowths from the* "*lamina terminalis.*"

When the "hemispheres" *begin to grow* from the "*lamina terminalis*" they do not constrict, or cause a separation or division of the "*lamina terminalis*," from which they spring. Where they are in contact with each other there is, in that direction, resistance to their growth and expansion; there is less resistance on their free sides, and they grow in the direction of least resistance, and consequently *diverge. But the* "*lamina terminalis*" *remains*

with numerous processes. Some of these branching cells are irregular in form and position, but the majority are more regularly pyramidal in shape, with the apex of the pyramid turned towards the surface of the convolution. Some of the cells are so large that they are called 'giant-cells.'

"The process from the apex of each cell may be traced for some distance towards the surface of the convolution, giving off one or two branches as it passes outwards. The mode of termination of these branches is unknown. Several fine branching processes pass from the angles of the base of the cell and *run outwards or towards the medullary centre.* Some of these processes divide and ramify, the branches forming a network of fine anastomosing fibres, while others have been traced inwards undivided, and one process from each cell is probably continuous with the axis cylinder of a nerve-fibre.

"The *fibres* radiate from the *white centre* of *each* convolution in all directions into the grey cortex, having a course for the most part perpendicular to the free surface.

"Other fibres pass in various directions through the grey substance connecting its several layers. Gerlach describes bundles of medullated fibres at right angles to the radiating bundles, and forming with them a large-meshed network, in the interstices of which is *a still finer network* composed of the finest non-medullated nerve-fibres [axis-cylinders without any white or medullated covering], formed, as he believes, as in the grey substance elsewhere, by the interlacement and anastomosis of the ramifying processes from the nerve-cells."

Page 354.—"The *white matter* of the *hemispheres* consists of medullated fibres or nerves varying in size in different parts, but in general still smaller than those of the spinal cord and the medulla oblongata."

"The fibres of the medullary centre, though forming many different groups, may be referred to three principal systems according to the general course which they take: viz., (1) *Ascending* or *peduncular fibres*, which pass from the isthmus [the *pons varolii*] to the hemispheres. These fibres

increase in number as they ascend through the isthmus, and still farther in passing the *optic thalami* and *corpora striata*, beyond which they spread in all directions into the hemispheres. (2) *Transverse or commissural fibres, which connect the two hemispheres together.* (3) *Longitudinal or collateral fibres* (the association-fibres of Meynert), which, keeping on the same side of the mesial line, connect near or distant parts of the same hemisphere."

Page 329.—"*In the middle of the 'base' of the brain*, in front of the *optic commissure*, is the exterior portion of the base of the *great longitudinal fissure* which passes down between the hemispheres [by which the hemispheres are separated or divided]. At a short distance in *front* of the *chiasma* [the optic commissure] this *fissure* is crossed *transversely* by a white mass [nerve-fibres], which is the anterior extremity of the *corpus callosum* [the great commissure which unites the two hemispheres]. On gently turning back the *optic commissure*, a thin connecting layer of *grey substance*, the *lamina terminalis* is seen *occupying the space between the corpus callosum and the chiasma*, and continuous above the latter with the *tuber cinereum*. It is connected at the sides with the grey substance of the anterior perforated space, and *forms part of the anterior boundary of the third ventricle*; it is somewhat liable to be *torn* in removing the brain [the cerebral hemispheres, the cerebrum, or brain proper] from the skull; and in that case *an aperture would be made into the fore part of the third ventricle.*"

In that "thin connecting layer of grey substance" I suppose the parent-Ego to be situated.

Page 320.—"*The great longitudinal fissure* [just referred to] seen upon the upper surface of the brain, extends from before backwards throughout its whole length in the median plane, and thus separates the cerebrum into a right and left hemisphere. On opening this fissure *it is seen, both before and behind, to pass quite through to the base of the brain; but*

in the middle it is *interrupted* by a large transverse mass of white substance [nerve-fibres] named the *corpus callosum*, or great commissure, which connects the two hemispheres together."

The division thus goes only to the *base* of the hemispheres, but does not extend into the "lamina terminalis" from which, as we have seen, the "pair" of hemispheres originate. The lamina terminalis remains a "*single*" *organ, and it is certainly situated in the very centre of the nervous system. Its position in relation to the commissures* or masses of nerves which connect the hemispheres and other parts of the nervous system are indicated by Professor Balfour as follows. At page 365, Professor Balfour writes :—

"The most characteristic parts of the mammalian cerebrum are the commissures [collections of nerve-fibres] connecting the two hemispheres. These commissures are, (1) the anterior commissure, (2) the fornix, and (3) the corpus callosum ; the two latter being peculiar to mammals.

"By the fusion of the inner walls of the hemispheres in *front of the* "*lamina terminalis*," a solid septum is formed, known as the *septum lucidum, continuous behind with the lamina terminalis, and below with the corpora striata* [the great basal *motor* ganglia]. It is by a *series of differentiations within this septum* that the above commissures—the *anterior commissure, the fornix,* and *the corpus callosum—originate.*"

"In the *septum lucidum* there become first formed below, the transverse fibres of the *anterior commissure*, and in the upper part the vertical fibres of the *fornix*. The *vertical* fibres meet above the foramen of Monro, and diverge backwards, as the posterior pillars, to lose themselves in the cornu ammonis. Ventrally they are continued, as the descending or anterior pillars of the fornix, into the corpus albicans [or bulb of the fornix] and *thence into the optic thalami* [the great basal *sensory* ganglia].

"The *corpus callosum* or *great commissure* is not formed

till *after* the "anterior commissure" and fornix. It arises in the upper part of the region (septum lucidum) formed by the fusion of the lateral walls of the hemispheres [which spring from the lamina terminalis], and, at first, only its curved *anterior portion* is developed. The *posterior portion* is gradually formed as the hemispheres are prolonged farther backwards."

"The under surface of the *corpus callosum* is *connected behind* with *the fornix*, and in the rest of its length with the *septum lucidum*."

Through the septum lucidum it is connected with the corpora striata.

By the bulbs of the fornix it is connected with the optic thalami.

The relations of connection of the lamina terminalis with the commissures or connecting nerve-fibres of the cerebrum and with the great basal ganglia are certainly very remarkable, and, I think, support the supposition that the lamina terminalis is the seat of the patriarch-parent-Ego. A summary of these connections will show how strong is that support.

The lamina terminalis occupies the space between the corpus callosum and the chiasma or optic commissure.

It forms part of the third ventricle, and from it the cerebral hemispheres originate.

The *anterior commissure* is the first transverse commissure of the cerebrum to be developed in the embryo. It is also the most constant in the animal series.

The *optic commissure*—constituted by the union of the two optic tracts—is situated just behind the anterior commissure.

The *posterior commissure* appears as the *posterior* wall of the third ventricle. The lamina terminalis forms part of the *anterior* wall, bounding the third ventricle.

The *septum lucidum* extends vertically between the corpus callosum above and in front, and the anterior part

of the fornix behind; posteriorly it is bounded by the pillars of the fornix, *and by the lamina terminalis.*

The body of the *fornix* is connected behind with the under surface of the corpus callosum or great commissure, and in front it is connected with the septum lucidum—which is immediately connected with the *lamina terminalis.*

In front, the *corpus callosum* is reflected downwards and backwards, forming a bend called the genu or knee; the inferior portion, which is called the rostrum, becomes narrower and narrower as it descends, and is *connected with the lamina terminalis.* The under surface is connected behind with the fornix, and in the rest of its length with the *septum lucidum—which is connected with the lamina terminalis.*

In order fully to appreciate the immensity of the masses of medullary fibres thus shown to be directly or indirectly connected with the lamina terminalis, two points must be borne in mind—viz., the relative proportions of weight in man between the cerebrum and the other parts of the encephalon, and the size of the nerve-fibres.

	oz.	drs.
"The average weight of the cerebrum in males is	43	$15\frac{3}{4}$
" " " cerebellum	5	4
" " " pons and medulla	0	$15\frac{3}{4}$
entire encephalon	50	$3\frac{1}{2}$

"The weight of the spinal cord in the human subject, when divested of its membranes and nerves, is 1 to $1\frac{3}{4}$ oz. Its proportion to the encephalon, or total brain, is about 1 to 33."—QUAIN, *vol.* ii., p. 384.

"The medullated nerve-fibres form the white part of the brain, spinal cord and nerves.

"Their size differs considerably, even in the same nerve; but much more in different parts of the nervous system, some being as small as the $\frac{1}{12000}$th and others upwards of the $\frac{1}{1500}$th of an inch in diameter."—QUAIN.

The largest of the commissures—the corpus callosum—is about an inch in width, and nearly half an inch thick. How many millions of nerve-fibres must be present in it?

Balfour (vol. ii., p. 365), says :—

"Primitively the mammalian cerebrum, like that of the lower vertebrate, is quite smooth. In the majority a more or less complicated system of fissures is formed. The most important and first formed of these is the Sylvian fissure.

Page 368.—"The type of differentiation of each of the primitively simple vesicles forming the fore-, the mid- and the hind-brains is very uniform throughout the vertebrate series; but it is highly instructive to notice *the great variations in the relative importance of the parts of the brain in the different types.* This is especially striking in the case of the *fore-brain*, where the 'cerebral hemispheres,' which on embryological grounds we may conclude to have been hardly differentiated as distinct parts of *the fore-brain* in the most primitive types now extinct, gradually become more and more prominent, *till in the highest mammalia they constitute a more important section of the brain than the whole of the remaining parts put together.*"

Hoping that the reader will hold with me that there is a patriarch-parent-Ego, and that it is situated in the Lamina Terminalis in direct or indirect communication with all, or at any rate with most of the other egos of the organism, which are its children; that from the single cell, which has no command over any other cell, there is an ascending grade of cells which command, to a certain extent, other cells, as from the smallest ganglion up to such great ganglia as the basal ganglia of the hemispheres, the corpora striata and the optic thalami, and from these to others to the great motor centres within the hemispheres themselves, some of which, it would seem, may approach so nearly to the development of the parent-Ego *as to be able, to a certain*

extent, even to think, and may constitute the "second" and "third" personalities of Hypnotism, up to the patriarch-parent-Ego-soul itself, who uses the whole organism as an instrument, the great function of which is to assist the patriarch-Ego in efforting to satisfy its desires, the return for such service being that the parent-Ego shall provide, within certain limits, for the satisfaction of certain wants of the child-cells;—which leads us to the study of the method by which it uses its instruments, the method of reflex action.

CHAPTER XXXV.

REFLEX ACTION.—NON-LIVING UNCONSCIOUS MACHINES ONLY TEMPORARILY AUTOMATIC.—LIVING CONSCIOUS MACHINES PERMANENTLY AUTOMATIC.

THE outcome of our studies of the nature and constitution of living organisms is, that in all vital actions, from the lowest protophyte and protozoon up to the highest creature, man, there is present a psychological element, and that without the recognition of the presence of that psychological element, that capability of being conscious, of acting from desires, and of generating force, the phenomena presented by living creatures are incapable of rational explanation. This conclusion, however, is in diametrical opposition to the opinion of those who consider it to be certain that the only creature capable of consciousness is man,—who is a *conscious* machine or automaton,—and that all other creatures are mere machines or automata, and differ from man only in being destitute of consciousness, and that the actions both of man and all other creatures can be explained by reference to physical causes alone. That so-called vital phenomena—consciousness in man included—are consequent upon mere positional relations of matter and force; that these peculiar relations, being altered, the phenomena of which they were the cause necessarily cease, such cessation being what we call death; that as all things, without any exception, can be accounted for by natural causes,—there is no necessity to call in the aid of any imaginary *super*natural cause to account for anything.

Such is the doctrine of extreme materialism. We will proceed to consider from my own standpoint—which I suppose extreme materialism would describe as extreme psychism—the evidence adduced in its support.

In his article on Animal Automatism ("Science and Culture," p. 199), Mr. Huxley writes:—

"But in the seventeenth century the idea that the physical processes of life are capable of being explained in the same way as other physical phenomena, and therefore that the living body is a mechanism, was proved to be true for certain classes of vital actions; and, having thus taken firm root in irrefragable fact, this conception has not only successfully repelled every assault, but has steadily grown in force and extent of application, until it is now the expressed or implied fundamental position of scientific physiology."

Page 205.—"Modern physiology, aided by pathology, easily demonstrates that the brain is the seat of all forms of consciousness.

"It proves, directly, that these states of consciousness which we call sensations are the immediate consequences of a change in the brain, excited by the sensory nerves; and, on the well-known effects of injuries, of stimulants, and of narcotics, it bases the conclusion that thought and emotion are in like manner the consequence of physical antecedents."

Page 209.—"For of two alternatives one must be true: either consciousness is the function of a something distinct from the brain, which we call the soul, and a sensation is the mode in which the soul is affected by the motion of a part of the brain; or there is no soul, and a sensation is something generated by the mode of motion of a part of the brain. In the former case, the phenomena of the senses are purely spiritual affections; in the latter, they are something manufactured by the mechanism of the body."

At page 214, Mr. Huxley states Descartes' doctrine—

"*that brute animals are mere machines or automata, devoid not only of reason, but of any kind of consciousness.*"

Page 216.—"Descartes' doctrine," says Mr. Huxley, "is perfectly clear. He starts from 'reflex action' in man, from the unquestionable fact that, in ourselves, co-ordinate, purposive actions may take place, without the intervention of consciousness or volition, or even contrary to the latter. As actions of a certain degree of complexity are brought about by *mere mechanism*, why may not actions of still greater complexity be the result of a *more refined mechanism*? What proof is there that brutes are other than a superior race of marionettes, which eat without pleasure, cry without pain, desire nothing, know nothing, and only simulate intelligence as a bee simulates a mathematician?"

I hope I have adduced adequate reasons for believing that the actions of lives—from the lowest to the highest—can be accounted for only on the ground that all are capable of being conscious, that all desire pleasure, that all desire to avoid pain, and, if pain be present, desire to get rid of it.

Descartes seemed to consider that the only difference between brutes and man—other than the different degrees of complexity of their organisation—was that the brute was unconscious, while man was conscious, but that brute and man were alike "mere machines or automata."

I at once admit that both brute and man *are* machines and *are* automata; but not that they are "mere" machines, nor "mere" automata. They are machines, and something more.

Before proceeding to consider the phenomena of "Reflex Actions" and their bearing on psychological and ethical development, and on the answer to the question "Why does man exist?" it is essentially necessary that we should rightly understand the meaning of the words "automaton," automatism, automatic machine, mechanism, mechanical.

There are two kinds of automata: the mechanical or non-living, physical, *unconscious* machine or automaton; and the living, psychological, *conscious* machine or automaton.

An automaton, whether living or non-living, is any kind of thing or apparatus or arrangement of things which works, or moves, or "*goes*" *of itself*; which acts in virtue of the presence within it of some force or influence which causes it to work, or move, or "go." A clock "goes." A steam-engine "goes," an amœba "goes," a man "goes." They are alike, in so far as they have within *themselves* the *cause* of their motion. The difference between them is, that the non-living, physical, mechanical, unconscious automata—the clock and the steam-engine—"go" in virtue of a force which has been *put into them by something other than* 'themselves;" and which force, when expended, cannot be renewed by the machines themselves. When the clock has run down it cannot wind itself up. *Unless something outside of it* wind it up it will never "go" again. It has *in itself* no "automatic" power whatever. It is only a "mere" physical non-living, unconscious machine. It is automatic or self-moving only so long as the force which was "put into it" is unexhausted. The moment the force is exhausted it stops. It *ceases* to be an automaton. It cannot wind itself up. It was only *temporarily* automatic, and that which is "automatic" only in virtue of some force which has been put into it from the "outside" is a "mere "machine.

The steam-engine when "going" is, like the clock, a non-living, unconscious, temporarily automatic machine, the motive force of which has been "put into it" by something other than itself. It is automatic so long as there is sufficient steam in the boiler to keep it "going," without the intervention of the stoker. As soon as the steam is exhausted the engine stops. It was only *temporarily* automatic. It is a "mere" machine.

Now, an amœba is a machine, a man is a machine; but they are living, conscious machines. They can wind *themselves* up: they are not "*mere*" machines. They are *permanently* automatic. They are "living" machines.

CHAPTER XXXVI.

THE PROTOPLASM OF A CELL IS A MACHINE, AND THE INHABITING EGO IS ITS ENGINEER.

A CELL is to be called living only in virtue of there being present in it an indestructible power which can manifest itself by generating force—which *is* destructible—and by taking into itself from the outside by its own act, substances which it uses to produce force. The power itself is indestructible except by the Being who created it. We have seen that the group of powers which constitute an atom are indestructible, for we know of no change in the atom. It is, so far as we can ascertain, the same now as when it was created ; and we cannot see how it can *cease* to be, except by the action of the Power who caused it to *begin* to be. Shall the atom be immortal and the soul mortal? Hardly, I think. I cannot prove that either atom or soul is immortal, because the Creator of both may cause both to cease to be. But any other cause is absolutely inconceivable. So far as we can judge, atoms are of no value in themselves, but owe such value as they possess to their relation to living, conscious beings ; and it is conceivable that there may come a time in the history of vital development in which atoms may have no part—may cease to be of use to man ; and their Creator may cause them to cease to be. But that God should ever cause a soul to cease to be is—unbelievable.

There are, then, two kinds of machines or engines : the non-living and the living. But what constitutes a machine or engine? Ogilvie defines a machine or engine as follows :—

"1. Any contrivance or thing which serves to increase or regulate the effect of a given force, or to produce motion; or any object by the intervention of which a moving power is made to act upon any body, and overcome the force by which the latter resists the effort to change its state of rest or motion. Machines are divided into *simple* and *compound*. The initial force which puts a machine in motion is called the *first* or *prime mover*. 2. A term of contempt applied to a person whose actions do not appear to be under his own control, but to be directed by some external agency; a person who acts at the will or bidding of another. 3. An engine; an instrument of force. 4. Any organisation by which power is applied and made effective, or a desired effect produced; the whole complex system by which any organisation is carried on."

In the above we find a machine defined as an engine. The definition of this is given as follows:—

"Engine. 2. In *Mechanics*, any mechanical instrument of complicated parts which concur in producing an intended effect; a machine for applying any of the mechanical or physical powers to effect a particular purpose. 3. Any instrument in any degree complicated. That by which any effect is produced, as a steam-engine, a musket, a cannon, the rack, a battering-ram, etc. 4. Means; anything used to effect a purpose; a tool. An agent."

"Engineer. One who manages engines or machines."

An amœba is a machine, an engine; but it is a machine *plus* a conscious engineer—the soul in the amœba. Its engineer is not only present in it, but furnishes to the machine the initial force which puts it in motion, and which is called "the first or prime mover," which motion is "applied to effect a particular purpose." The "machine," the "engine," the "tool," *is the protoplasm of the cell*; the *engineer* who uses it is the *soul, the Ego*, which *inhabits* that protoplasm, that machine, that cell.

The "body" of a man is an aggregate of such soul-governed

machines. The chief engineer, the governor, the user, of that aggregate is the Patriarch-Parent-Ego, from whom they are each and all descended, and who "uses," them as "machines," tools, or engines in *efforting to satisfy its desires.*

Professor Foster, the reader may remember, describes "the *body* of the amœba, or of a similar organism, as a network, sometimes compressed, with narrow meshes; sometimes more open, with wider meshes, the intervals of the meshwork being filled, now with a fluid, now with a more solid substance, or with finer and more delicate and minute particles or granules of variable size being sometimes lodged in the open meshes, sometimes deposited in the strands of the network. . . . At times the bars or films of the network are not homogeneous, but composed of different kinds of stuff. . . . The body of an amœba, then, or of a similar organism, consists of a network or framework which we may speak of as protoplasm, filled up with other matters."

I think it is clear that the "network" is the machine, or engine, in which the engineer, the soul, resides and works.

From the opening address of the president of the section of Biology, Professor Burdon Sanderson, delivered before the British Association, 1889 (published in *Nature*, Sept. 26th of the same year), I quote the latest delivery of science. At page 523 Professor Burdon Sanderson says:—

"I have indicated to you that, although scientific thought does not, like speculative, oscillate from side to side, but marches forward with a continued and uninterrupted progress, the stages of that progress may be marked by characteristic tendencies; and I have endeavoured to show that in physiology the questions which concentrate to themselves the most lively interest are those which lie at the basis of the elementary mechanism of life.

"The word Life is used in physiology in what, if you like, may be called a technical sense, and denotes only that state

of *change with permanence* which I have endeavoured to set before you. In this restricted sense of the word, therefore, the question "What is Life?' is one to which the answer is approachable ; but I need not say that in a higher sense —higher, because it appeals to higher faculties in our nature—the word suggests *something outside* of '*mechanism*,' which may perchance be *its cause*, rather than its effect.

"The tendency to recognise such a relation as this is what we mean by vitalism. . . . Thirty years ago the discovery of the cell as the basis of vital function was new, and the mystery which before belonged to *the organism* was transferred to *the unit, which, while it served to explain everything, was itself unexplained.* The discovery of the cell seemed to be a very close approach to the mechanism of life, but now we are striving to get even closer, and with the same result. Our measurements are more exact, our methods finer ; but these very methods bring us to close quarters with phenomena which, although within reach of exact investigation, are as regards their essence involved in a mystery the more profound the more it is brought into contrast with the exact knowledge we possess of surrounding conditions."

It would seem that the more profound are the studies of the greatest scientists of the phenomena of Life, the less explicable they become when considered as mere products of physical and chemical action. Vital processes cannot be explained by mere unconscious mechanism, however complex or "refined." The actions of the humblest of living creatures cannot be accounted for on any other ground than the presence in it of a Life, or soul, or mind, or spirit, or Ego, which is capable of being conscious, which is capable of desiring, which is capable of efforting to satisfy its desires.

It may be well to give here an illustration of the concomitant working of a "mere" non-living machine, and of a living machine—or rather, groups of living machines—

use of the protoplasm of the human organism as means towards the attainment of a desired end.

[illegible] in the protoplasm-machine of the great aggregate of living conscious machines which I call my "body." I have two pieces of cloth: I wish to sew them together. I take a non-living, unconscious, non-automatic "sewing-machine." I place the two pieces of cloth in the proper position. I put my foot on the treadle. I exert on the treadle a certain amount of force. It begins to "go." I temporarily convert the "mere" machine into an "automaton." While with my feet I work the treadle, with my hands I keep the pieces of cloth in the proper position, and continue the application of my force till the seam is finished.

In order to produce the effects just described, I have used my eyes, legs and arms, etc., as "machines;" but every group of cells, every group of groups of cells, I have used is composed of individual, living, permanent, amœba-like automata capable of being conscious, capable of desiring, of willing, but my will dominates their wills. They are so subordinated to my service that I can make use of them in certain ways. They are so co-ordinated, so trained, that, given certain ends, they act as I desire them to act. In the present case the result of my purposive effecting upon the groups of living, conscious, permanently automatic machines which constitute my eyes and arms and legs, etc., and hence consequent action upon the non-living, unconscious sewing-machine, which was thereby rendered temporarily automatic, is the satisfaction of my "desire" to have the two pieces of cloth sewn together.

Descartes' reasoning was founded upon the belief that the brain is the seat of all consciousness, and consequently out of the brain there is no consciousness; and that any action which a human being performed unconsciously was therefore purely mechanical. As we have seen, he maintained that, although brutes have brains, they are nevertheless "mere machines or automata, devoid not only of

reason, but of any kind of consciousness." To brutes he—very inconsistently, seeing he could not deny that they possessed brains—denied the possession of souls or minds.

"It will be easily seen," he says, "that all the actions of beasts are similar only to those which *we* perform *without the help of our minds*."

My own belief is directly opposed to that of Descartes. It is, that every cell is inhabited by a soul, and is capable of being conscious; that the multicellular organism consists of the patriarch-parent-Ego-soul and its children, each of which remains connected with the patriarch-parent-Ego-soul, and is more or less subordinated to its use; and that development means the subordination of greater and greater numbers of child-cells to the service of the patriarch-cell, which has *trained* various groups of cells to the performance of certain particular functions or actions, and in many cases has trained them so perfectly that they are able to perform such functions with little or no supervisional direction of the patriarch parent-Ego, which is thereby left at liberty to develop itself in new directions.

CHAPTER XXXVII.

"EVERY CELL HAS A WILL OF ITS OWN" (FOSTER), CONSEQUENTLY CONSCIOUSNESS MUST BE UNIVERSAL.

At page 35 of his "Text-Book of Physiology," Professor Michael Foster writes:—

"The greater number of the complex movements of the animal body are carried on by means of the skeletal striated muscles. A skeletal muscle, when subjected to certain influences, contracts, *i.e.* shortens, bringing its two ends nearer together; and the shortening, acting through various bony levers, or by help of other mechanical arrangements, produces a movement of some part of the body."

Page 36.—"All the ordinary striated muscles are connected with nerves."

Page 38.—"Both nerve and muscle are irritable, but only the muscle is contractile—*i.e.* manifests its irritability by a contraction. The nerve manifests its irritability by transmitting along itself—without any visible alteration of form—certain molecular changes set up by the stimulus. We shall call these changes thus propagated along a nerve a 'nervous impulse.'"

Page 83.—"A nervous impulse is a molecular disturbance travelling along the nerve in the form of a wave."

Page 84.—"A weak stimulus gives rise to a weak nervous impulse, and a strong stimulus gives rise to a powerful nervous impulse. As far as we know at present, nervous impulses, whatever their origin, are alike in nature."

Page 104.—"In its simplest and probably earliest form

a nerve is nothing more than a thin strand of irritable protoplasm, forming the means of vital communication between a *sensitive* cell exposed to extrinsic accidents, and a *muscular*, highly contractile cell."

Page 105.—"We have already seen that automatism—*i.e.* the power of *initiating* disturbances or 'vital impulses,' independent of any immediate disturbing event, or stimulus from *without*—is one of the fundamental properties of protoplasm"—that is, of the life or soul *inhabiting* the protoplasm.

"Such a mass of protoplasm as an amœba, though susceptible in the highest degree of influences from without, *has a will of its own; it executes movements which cannot be explained by reference to any changes in surrounding circumstances at the time being.* A hydra has also a will of its own; and seeing that all the constituent cells (beyond the distinction into ectoderm and endoderm) are alike, we have no reason for thinking that "the will" resides in one cell more than in another, but are led to infer that the protoplasm of each of the cells (of the ectoderm at least) is automatic, *the will of the individual being the co-ordinated wills of the component cells.* In both hydra and amœba the processes concerned in automatic or spontaneous impulses, though in origin independent of, are subject to and largely modified by influences proceeding from without."

When Professor Foster says "every amœba has a will of its own," he practically asserts the principle for which I contend—universal consciousness. When we "will," we do so because we desire something, and willing is purposing to use means for the satisfaction of such desire; and to desire without being conscious is inconceivable. Professor Foster says: "The hydra [considered as an individual] has also a will of its own; and seeing that all the constituent cells (beyond the distinction into ectoderm and endoderm) are alike, we have no reason for thinking that "the will" resides in one cell more than in another, but are led to infer that the

protoplasm of each of the cells [the soul in each of the cells] is automatic, the will of the individual [that is, the total of the cells considered as an individual animal] being the co-ordinated wills of the component cells."

There is a will present in every cell, but in *one* of the cells there is a will stronger than the will of any of the others, a will which has more or less subordinated the other wills to its own—the will of the patriarch-parent-cell. Consideration of Professor Foster's statement will, I think, help us to understand the rationale of what is called Reflex action.

CHAPTER XXXVIII.

WILLS OF CHILD-EGOS SUBORDINATED TO WILL OF PATRIARCH-EGO.—CO-ORDINATED ACTION.—SIMULTANEOUS ACTION.

In the primary foreshadowing of the multicellular organism, the "colony," each cell was practically independent of all the others. If detached from it, it could still live and provide for itself. There was no "subordination" to the will of the parent-cell; there was practical equality.

In the multicellular hydra, which is little more than a "gastrula," the vegetative and nutritive cells are, as a body, subordinated to the animal cells, whose functions are those of motion and feeling.

In the formation of the gastrula by the action of the animal cells upon the vegetative cells we saw how the great primary "division of labour"—of which we saw the primary indication in the division by the flagellate protozoon of its protoplasm into corticate and medullary, into animal and vegetative—was effected.

Professor Foster speaks of the "will" of the individual, the hydra, being the *co-ordinated wills of the component cells*"—a statement which needs the most careful consideration, because it seems to me that "co-ordinated" action is often supposed to be present when the action is merely simultaneous action. The motions of a colony are only simultaneous motions; those of a man are, or may be co-ordinated. When a motion of a colony occurs, there is no co-ordination, for all are alike, all desire the same things. When a motion of the hydra occurs, all, or at any rate a

large number, of the cells act alike: but are their wills "co-ordinated"? or is it that they merely act "simultaneously"? the cause of such simultaneous action being that as they are all alike and have the same desires, the same aversions, any stimulus, whether direct or communicated from one to another, will produce similar effects on each and all, and co-ordination has no part, or only a very small part, in the dynamic events which follow upon the action of the stimulus.

Let us place ourselves in a crowded street, running east and west. All the people moving west move in that direction "simultaneously," but their motions are not "co-ordinated." They move "simultaneously," because each person desires to move toward the west, and they all happen to "desire" to do so at the same time. The same with all those who move towards the east. There is no co-ordination, only simultaneity; and any one, if he desire to do so, can at any time change the direction of his motion. If we stand still a little while we shall see some passengers stopping, some turning back, some turning into side-streets, some crossing from one side to the other. All these changes of direction of motion or of cessation and resumption of motion, are consequent upon desires arising in those who so act; their motions are not co-ordinated, but are merely simultaneous. Each does what he desires to do, and his changes of direction of motion are consequent upon changes of desire.

Let us suppose a regiment of soldiers to march along the street with its colonel in command, its majors, captains, lieutenants, sergeants, corporals. Any changes of direction of the whole regiment, or of any part of it, are consequent upon the will of the colonel, expressed either by his own voice or by that of some officer who has received orders from him. They do not merely walk, and at such pace as each might choose: they move in that particular ordered way called marching. Each soldier

would, if he were at liberty, act as he chanced to desire: one would like to march more slowly; another, who was hungry for his dinner, would like to march quicker; another, who was tired or not in good health, would like to stop altogether and rest. But whatever the desires of the individual soldiers may be, they must march at a given pace and in a given direction. Each has his particular will or desire, but it is overruled by, and so "co-ordinated" to, the will of the commander. They have been *trained to obedience*; and if any difference of desire arises between the commander and the individuals composing the regiment—whether of officers or men—they have to act as the commander wills. Each soldier has his own will, his own desire, but it is "subordinated" to the will of the commander, and hence the "co-ordination." If all the men were the children of the commander, the commander would be the "patriarch-parent-Ego" of the regiment.

Wherever there is co-ordination there is, or has been, more or less compulsion; for every life in every cell prefers the satisfaction of its own desires to those of any other life or lives. If the desires of the parent-cell and the desires of the child-cell *coincide*, their action together will be spontaneous. If they differ, then the parent uses force, and, if he is able, compels obedience. If the child learns to *like* what it is ordered to do, then less and less compulsion and supervision will be needed, and the child may be trusted to do of itself what the parent desires. In fact, *the will or desire of the child becomes identical with the will or desire of the parent*, and we have "Reflex action." Nevertheless, the nerve by means of which the parent made known its desires to the child, and the nerve by means of which the child made known its desires to the parent, still exist; and should difference of desire arise the parent can still attempt to coerce the child, successfully or unsuccessfully, as the case may be, and the child, is still able, successfully or unsuccessfully, to resist such coercion.

In the "colony" the cells are all practically equal, and hence there is no progress, no development, no evolution.

In the first multicellular organism the cells were all equal, with one exception—that of the compound or germ-cell, the patriarch parent-cell, which, owing to its particular mode of origination [already described] was superior to all its children. The result of that superiority has been the ascent from the lowest multicellular organism to man, the means being *the slow subordination of the children to the service of the parent*, the most remarkable examples of such subordination being the phenomena presented in those complex, co-ordinated, trained operations which can be performed by the organs concerned either with or without the co-operation and direction of the patriarch-parent-Ego, which are termed Reflex actions, and which are erroneously, I think, supposed to be merely mechanical.

CHAPTER XXXIX.

REFLEX ACTION NOT MERELY REFLEX, BUT CHIEFLY DETERMINED BY PURPOSIVE ACTION OF THE CELL-EGO.

At page 109, Professor Foster describes reflex action :—

"In its simplest form a reflex action is as follows. All the machinery it demands is, a sentient surface [external or internal] connected by a sensory or afferent nerve with a central nerve-cell or group of connected nerve-cells [a ganglion] which is in relation, by means of a motor or efferent nerve or nerves, with a muscle, or muscles, or some other irritable tissue-elements, capable of responding by some change in their condition to the advent [or action, or stimulus] of efferent or motor impulses. The afferent 'impulses' started on the sentient surface passing along the sensory nerve, reach the central nerve-cell or group of nerve-cells, and there produce a cognisable effect.

"The essence of a reflex action consists in the *transmutation* by means of the irritable protoplasm of a nerve-cell of *afferent* [or sensory] into *efferent* [or motory] impulses. As an approach to a knowledge of the nature of that transmutation we may lay down the following propositions.

"*The number, intensity, character and distribution of the efferent impulses are determined, chiefly, by the events which take place in the protoplasm of the reflex centre* [Professor Foster's italics]. It is not that the afferent impulse is simply *reflected* in the nerve-cell, and so becomes with little change an efferent impulse : on the contrary, an afferent impulse, passing along a sensory fibre, may give

rise to efferent impulses passing along many motor centres, and call forth the most complex movements. An instance of this *disproportion* of the afferent and efferent impulses is seen in the case where the contact with the glottis of a foreign body so insignificant as a hair causes a violent fit of coughing. Under such circumstances a slight contact with the mucous membrane, such as could not possibly give rise to anything more than few and feeble impulses, may cause the discharge of so many efferent impulses along so many nerves that not only all the respiratory muscles but almost all the muscles of the body are brought into action. Similar though less striking instances may be seen in most reflex actions. . . . The simple passage along a nerve is accompanied by little expenditure of energy; it neither gains nor loses force to any great extent as it progresses. The 'transmutation' in a nerve-cell is most probably (though the direct proofs are perhaps wanting) accompanied by a large expenditure of energy, and a simple nervous impulse in suffering the 'transmutation' in a central nervous organ may *accumulate in intensity* to a very remarkable extent, as in the case of strychnia poisoning.

"We are therefore obliged to conclude that in a reflex action the processes which are originated in the central nerve-cells by the arrival of even simple impulses along afferent nerves may be highly complex, and that it is the 'constitution and condition' of the nerve-cells which *determine* the complexity and character of the movements which are effected."

Every one, by contact of a hair, or of some equally insignificant substance, has experienced the phenomena described above. If we ask why a cause, so trifling, from a physical and mechanical point of view, should produce so great and disproportionate effects, the answer, I think, is that, insignificant and small as was the physical action of the hair, it was yet *so intensely disagreeable to the soul inhabiting the cell with which it came in contact as*

to give rise to a convulsive effort to remove its cause. The effects produced upon a nerve-cell by a given stimulus *are not determined by the amount of force of the stimulus*, but by the mode—pleasurable or painful—in which the soul inhabiting the cell is *affected* by it. The mere mechanical force exercised by the hair was, as one may say, nothing. Its effects upon the soul inhabiting the cell were such as to bring almost all the muscles of the body into more or less violent motion.

I would suggest that there is no "transmutation" at all of the afferent impulse into an efferent impulse, of sensory into motory; but that the afferent nervous impulse-force is *expended* in affecting the soul of the cell, and that the efferent impulse is consequent upon the way in which the soul is *affected* by the sensory impulse. A very small impulse, such as contact of a hair with the glottis, could not of itself, as a simple amount of reflected force, bring not only all the respiration muscles, but almost all the muscles of the body, into action. The very much more forcible contact of food with the glottis produces no such violent effects. We must conclude, with Professor Foster, that "it is *the constitution and condition of the nerve-cells* which *determine* the complexity and character of the movements which are effected."

"*The number, intensity, character, and distribution of efferent impulses are determined chiefly by the events which take place in the protoplasm of the reflex centres* [Professor Foster's italics]. It is not that efferent impulse is simply *reflected* in the nerve-cell, and so becomes, with little change, an afferent impulse."

Amongst schoolboys there is a mischievous kind of game in which one boy pinches the boy next to him, and says, "Give that to your next neighbour," who accordingly gives the next boy a pinch, with the same request. That boy passes it on, and the process is continued indefinitely.

Now, the pinch received by the third boy is not the

"transmuted pinch" received by the second boy. The force of the first pinch was expended upon the second boy, the receiver. Its effect was to produce in the second boy a desire to pinch the next boy—the third. To satisfy that desire he exerts force; but the force he exerts is not the "transmuted force" exerted upon himself by the first boy: it is his own force. The force exerted by the first boy was called into action to satisfy his desire to pinch the second boy, and was expended in pinching him. The desire of the *first* boy to pinch the *second* boy was consequent upon *thought*; the desire of the second boy to pinch the *third* boy was consequent upon a *sensation*, which gave rise to that desire. In both cases the exertion of force was consequent upon a desire. In both cases the cause of action was psychological. *Between* the afferent action upon an individual nerve-cell-Ego and the consequent efferent action there comes in the *psychological* action, so that every efferent action, instead of being merely reflected, physical, mechanical, is volitional and purposive.

CHAPTER XL.

"THE SALIENT FEATURE OF ORDINARY REFLEX ACTIONS IS THEIR PURPOSEFUL CHARACTER" (DR. FOSTER).—EXAMPLES.

At page 586 Professor Foster writes :—

"Both in the cold-blooded and warm-blooded animals *the salient feature of ordinary reflex actions is their purposeful character*, though every variety of movement may be witnessed from a simple spasm to a most complex manœuvre ; and in all reflex movements, both simple and complex, we can recognise certain determinate causes, the influence of which more or less directly contribute to the shaping of this *purposeful* character."

Page 591.—"It is a remarkable fact that, when the brain of a frog is removed, reflex actions are developed to a much greater degree than in the entire animal. This suggests the idea that there must be in the brain some mechanism or other for preventing the development of the spinal reflex actions."

That is, that all ganglionic nerve-centres and their nerves being connected with the patriarch-Ego in the Lamina Terminalis, it exercises, or is able to exercise, a continuous controlling action upon all the parts of the body.

Let us consider some of the phenomena of Reflex action as set forth by Professor Ferrier in his wonderful work on the Functions of the Brain.

At page 109 he writes :—

"The phenomena manifested by animals deprived of their cerebral hemispheres vary considerably in the different

classes of vertebrate animals, differences which mainly depend on the degree of *solidarity*,—as Vulpian well expresses it,—which subsists between the individual centres of the cerebro-spinal system, *according as we ascend or descend the animal scale.*

"In the case of the frog deprived of the cerebral hemispheres, the following are among the chief phenomena which are observed.

"Deprived of its cerebral hemispheres, the frog will maintain its normal attitude, and resist all attempts to displace its equilibrium. If laid on its back, it will immediately turn on its face, and regain its station on its feet. If placed on a board, and the board be tilted in any direction, the animal will make the appropriate bodily movements to throw its centre of gravity within the base of support. If its foot be pinched it will hop away. If it is thrown into the water it will swim until it reaches the side of the vessel, and then clamber up and sit perfectly quiet. If its back be stroked gently it will utter loud croaks. Indeed, in many respects it would be difficult to say that the removal of the hemispheres had caused any alteration in the usual behaviour of the animal. If placed in a vessel of water, the temperature of which is gradually raised, it will leap out as soon as the bath becomes uncomfortably hot. If placed at the bottom of a pail of water, it will ascend to the surface to breathe. *There is a method in its movements.* If an obstacle be placed between it and the light of a window, the frog will not spring blindly against the obstacle when its toe is pinched, but will clear it, or spring to the side. It will alter the course of its leap according to the position of the obstacle between it and the light.

"*There is, so far, no difference between its behaviour and that of a frog in full possession of all its faculties. But a very remarkable difference is perceptible.*

"The brainless frog"—[not quite brainless, seeing it still

possesses all its special organs of sense and all the nerves and ganglia below the lost hemispheres, along with which it lost its patriarch-Ego]—"the brainless frog, unless disturbed by any form of peripherical stimulus, will sit for ever quiet on the same spot, and become converted into a mummy. *All spontaneous action is annihilated. Its past experience has been blotted out*, and it exhibits no fear in circumstances which otherwise would cause it to retire or flee from danger. It will sit quite still if the hand be put forth to seize it, but will retreat if a brusque movement is made close to its eyes. Surrounded by plenty, it will die of starvation; but, unlike Tantalus, it has no psychical suffering, no desire, and no will to supply its physical wants.

"The results which have been observed in fishes after similar ablation of the cerebral hemispheres are *cæteris paribus* of the same nature as those seen in frogs.

"The results of removal of the cerebral hemispheres in pigeons.

"A pigeon so mutilated continues able to maintain its equilibrium and to regain it when disturbed. When placed on its back it succeeds in regaining its feet. When pushed or pinched it marches forward. Should it happen to step over the edge of the table it will flap its wings until it regains a firm basis of support. When thrown in the air it flies with all due precision and co-ordination.

"*Left to itself it seems plunged in profound sleep.* From this state of repose it is easily awakened by a gentle push or pinch, and looks up and opens its eyes. *Occasionally—apparently without any external stimulation*—it may look up, yawn, shake itself, dress its feathers with its beak, move a few steps, and then settle down quietly, standing sometimes on one foot and sometimes on both. Should a fly settle on its head it will shake it off. If ammonia be held near its nostrils it will start back. Should the finger be brusquely approximated to its eyes, it will wink and

retreat. A light flashed before its eyes will cause the pupils to contract; and if a circular motion be made with the flame, the animal may turn its head and eyes accordingly. It will start suddenly and open its eyes widely if a pistol be discharged close to its head.

"*After each active manifestation called forth by any of these methods of stimulation, the animal again subsides into its state of repose. It makes no spontaneous movements. Memory and will seem to be annihilated.* When irritated it may show fight, both with wings and beak; but it exhibits no fear and makes no attempts at escape. It resists attempts to open its beak for the purpose of introducing nourishment; but should its resistance be overcome, it swallows as usual. *If fed artificially, it may be kept alive for months; but, left to itself, it will die of starvation like the frog or fish.*"

Professor Ferrier proceeds to discuss how the facts stated above are to be explained. He says (p. 115):—

"When we turn from the consideration of the facts themselves to the theory of their explanation, we enter on a *quæstio vexata* of physiology and psychology.

"One fundamental fact, however, seems to be conclusively demonstrated by these experiments—viz., that in the absence of the cerebral hemispheres the *lower centres*, of *themselves, are incapable of originating active manifestations of any kind.* An animal with brain intact exhibits a varied spontaneity of action not—at least, immediately—conditioned by present impressions on its organs of sense. When the hemispheres are removed, all the actions of the animal become the immediate and necessary response to the form and intensity of the stimulus communicated to its *afferent* nerves. Without such excitation *from without* the animal remains motionless and inert. It is true that some of the phenomena which have been described would seem *opposed to this view*, but they are so in appearance only and not in reality. Thus we have seen that a frog may occasionally

move its limbs spontaneously, and a bird may yawn, shake its feathers, or change its foot; but these actions are the result of impressions arising from cutaneous irritation or internal discomfort—ento- or epi-peripherical impressions—or in some cases from the irritation caused by the wounded surface resulting from the operation."

I submit that these actions are not the result of any "stimulus communicated to afferent nerves," and are directly opposed to the assertion that "in the absence of the cerebral hemispheres, the lower centres, of themselves, are incapable of originating active manifestations of any kind." "Cutaneous irritation" and "internal discomfort" are not "impressions," but are states of the souls of the cells concerned *caused* by "impressions." They are states which are disagreeable or painful—terms which necessarily imply the presence of consciousness—and give rise to desires to change such states, and which give rise to the actions described. They are clearly volitional.

CHAPTER XLI.

DR. FERRIER ASKS: "IS REFLEX ACTION PURELY 'PHYSICAL' OR HAS IT A 'SUBJECTIVE' SIDE?"

"WE have next to inquire," continues Dr. Ferrier (p. 176), "what is the nature of the impression which is the immediate antecedent of this responsive activity? Is it a purely 'physical' phenomenon? or has it likewise a 'subjective' side? In other words, are these actions merely reflex or excito-motor? or are they accompanied by sensation properly so called? If we define sensation as the consciousness of an impression, it will be seen that the problem to be solved is *whether consciousness is an accompaniment of the activity of these centres*, and whether, therefore, we have to deal with truely *psychical* phenomena?"

I hope I have already given a valid answer to these questions. There is a "physical side," the external, "physical," afferent stimulus which, entering the nerve-cell, causes some change in its physical state. The "psychological," "subjective" effect of that change of state upon the Life, the soul, the mind, the Ego, inhabiting that cell, is to cause it to be in a state of pain or discomfort, which gives rise to a desire to change that state, which gives rise to a volition to perform some act the "purpose" of which shall have relation to the end desired,—"to get rid of the pain." The "desire" of the conscious Ego of the cell comes in *between* the "impression," the "excito," and the subsequent "motor" action of which that "desire" is the cause. The motor action is not unconscious and reflex, but conscious and volitional.

An "impression" is a general name for the *cause* of a given state of an Ego, *not the state itself.*

But an afferent stimulus does not *necessarily* cause an impression which gives rise to a state, which gives rise to desire to cause motor action. My organs of touch, taste, smell, hearing, sight, may be simultaneously stimulated without my moving at all. *If the doctrine of reflex action were true, there would be movements consequent upon every stimulation, and the force of the movements would always be proportionate to the force of the stimulation.* There could be no such *disproportion* between the afferent stimulus and the motor effect, such as was shown in the case of the movement of almost all the muscles of the body caused by the touch of the glottis by a hair. When the leg of the frog, deprived of its hemispheres and of its patriarch-Ego, is pinched and hurt, it is *withdrawn*, and motion is caused; when its back is gently stroked it croaks with pleasure, and makes no motion to remove itself from the cause of its pleasure.

Dr. Ferrier continues (page 176) :—

"If we adopt the metaphysical view that mind and consciousness form an indivisible unity, and that annihilation of one great class of mental manifestations necessarily involves the annihilation of mind as a whole, seeing that the indivisible cannot be divided, it would be easy to argue that as the ablation of the hemispheres abolishes certain fundamental powers of the mind, therefore the functions of the lower centres must be *outside the sphere of the mind proper.*"

If mind and consciousness formed an "indivisible unity," then the cessation of consciousness would be the cessation of the mind also,—an opinion which can hardly be entertained. The mind is an entity, consciousness is a state.

But Dr. Ferrier himself sees objections. He continues:—

"But this way of looking at the subject will not harmonise with the facts of physiology, for, as we shall find when we

come to discuss the functions of the hemispheres, whole tracts may be completely and irrevocably cut out of the territory of intellectual consciousness without interfering with the integrity of consciousness in others; and will may be abolished while consciousness remains. Hence we are not entitled to say that mind, as a unity, has a local habitation in any part of the encephalon, but rather that mental manifestations in their entirety depend on the conjoint action of several parts, the functions of which are capable of being individually differentiated from each other."

Dr. Ferrier says (as quoted above) :—

"As the ablation of the hemispheres abolishes certain fundamental powers of the mind, therefore the functions of the lower centres must be outside the sphere of the mind."

For the ambiguous and indefinite term "the mind" let us substitute the clear, definite term, the patriarch-Ego, which is the principal-Ego in the organism. Every nerve-cell-ego and group of nerve-cell-egos constituting a ganglion, is "outside" the patriarch-Ego *itself*, is external to it. But it is not outside its "sphere of action." The nerve-cell egos, whether as individuals or as ganglionic groups or nerve centres, are brought *within* the "sphere of action" of the patriarch-Ego by means of the nerves. When given motor-nerves are severed all actions which were dependent on their integrity are, so far as the patriarch-Ego is concerned, rendered impossible. All the nerve centres or ganglia below the point of severance are, in such case, removed from, and are not only outside the patriarch-Ego itself, but are also outside the "sphere" of its action. Whatever actions, after such severance, may be performed by such centres must be the result of other influences. They must be stimulated or initiated either from without, or by causes inherent in the nerve-cells themselves—that is, by their own desires; but of such actions the patriarch-Ego cannot be conscious, seeing that the nerve communications are cut. But though the patriarch-Ego can no longer be

conscious of such actions, it has not therefore lost any of its *powers*. None of them are "abolished." It has only lost the *use* of some of the *instruments* by means of which it was able to *exercise* its powers.

The severance of the connecting motor-nerves merely removes the egos of the ganglia or nerve centres concerned "outside" its "sphere" of action; but they were always outside *it*. *Ablation of the hemispheres* not merely abolishes certain fundamental powers of the patriarch-Ego, but abolishes the patriarch-Ego itself; for, on removing them, the patriarch is slain.

Dr. Ferrier says above:—

"We are not entitled to say that mind as a unity has a local habitation in any part of the encephalon, but rather that mental manifestations *in their entirety* depend on the conjoint action of several parts, the functions of which are capable of being individually separated from each other."

I previously quoted a passage from Dr. Ferrier on the same subject. I requote it here, together with my comment upon it:—

"When Dr. Ferrier says (page 467), 'It would, however, be absurd to speak of a special seat of intelligence or intellect in the brain: intelligence and will have no local habitation distinct from sensory and motor substrata of the cortex generally,' I quite agree with him, only I go farther in the same direction; for, as every cell—or, more correctly, every soul inhabiting every cell—is capable of being conscious, and therefore capable of intelligence, there can be no 'special seat of intelligence' either in the brain or in any other part of the body, seeing that mind is everywhere present in it; but at the same time, though there is no special *seat* of intelligence, there *is* a 'seat' of a 'special intelligence,' and that such 'special intelligence' is the patriarch-parent-germ-cell of the organism, and constitutes the *Ego*, the *I*, of the organism."

When Dr. Ferrier expresses his opinion "that mental

manifestations in their *entirety* depend on the conjoint action of several parts, the functions of which are capable of being individually separated from each other," he refers only to the "encephalon" or total brain contained within the skull. I extend the "parts" to every cell of the whole organism.

Psychologically, the organism consists of the patriarch-Life, or Ego, or soul, or mind, or spirit; and the lives, or egos or souls, or minds, or spirits, of the sum of its children. *Physiologically*, it consists of the cells which they inhabit. Each cell is inhabited by its individual ego, and each ego and cell for ever remains different from all other. Each, therefore, has a special "seat," or local position, in relation to all others. What the human creature calls, "I," "myself," consists of only *one* of these cells; but one which, like Aaron's rod, may be said to have—not swallowed—but "subordinated" to itself "all the rest," its "special seat" being, as I think, *the Lamina Terminalis*—a part of the organism which, so far as I know, has never been considered to be of any special importance. Strictly speaking, there is no "the ego," no "the mind," for "every cell has an ego, a mind, a will of its own." Yet, from its immense superiority over all its children, I think the patriarch-Ego *must* be called *the* Ego by *us*, for it is *ourself*. Whenever I use the term "the Ego," I shall mean the patriarch-Ego, which is me, which is myself.

CHAPTER XLII.

DR. FERRIER ON APPARENTLY IDENTICAL CHARACTER OF REFLEX ACTION, AND OF ACTIONS PERFORMED CONSCIOUSLY.

DR. FERRIER'S next sentences are of the most profound importance. He says (page 117) :—

"If we have regard merely to the *character of the reactions* which result from impressions made on the various organs of sense, it will be found impossible to distinguish between *them* and *those* which are actuated by a distinct *consciousness* of the impressions. Thus, a severe pinch on the tail or foot of a brainless rabbit elicits not merely convulsive reflex *movements*, such as may result from the activity of the spinal cord alone, but calls forth the repeated and prolonged *cry* which is characteristic of *pain*. The frog, in like manner, would appear to have *a distinct sense of pain* when it makes frantic efforts to escape from the hot bath. And it would seem to be a *consciousness of retinal impressions* which causes the frog, when urged to move, to leap aside so as to avoid an obstacle placed in its path; or which causes the fish, under similar circumstances, to deviate sharply from the straight course which it otherwise pursued."

On the previous page (116), Dr. Ferrier writes :—

"I have already, in discussing the functions of the spinal cord, observed that the existence or not of consciousness in others than ourselves is entirely a matter of inference or testimony. In the lower animals we can only judge from

the character of the phenomena they manifest, and by analogy with our own actions."

Then, if two similar creatures—the one with and the other without its hemispheres—under similar circumstances act in a similar manner, is it not entirely illogical to "infer" that the one acts consciously and the other does not? It seems to me to be impossible to account for actions called reflex without "inferring" that they are performed consciously and as means to ends.

At page 255 I quoted Professor Foster's words :—

"Both in the cold- and warm-blooded animals *the salient feature of ordinary reflex actions is their purposeful character.*

"*An amœba*, though susceptible in the highest degree to influences from without, *has a will of its own*; it executes movements which cannot be explained by reference to any changes in surrounding circumstances at the time being."

At page 251:—

"*The number, intensity, character, and distribution of the efferent impulses are determined chiefly by the events which take place in the protoplasm of the reflex centre* [Professor Foster's italics]. It is not that the afferent impulse is simply *reflected* in the nerve-cell, and so becomes with little change an efferent impulse."

At page 256 I quoted Dr. Ferrier :—

"Indeed, in many respects it would be difficult to say that *the removal of the hemispheres* [of the frog] *had caused any alteration* in the usual behaviour of the animal."

At page 118 Dr. Ferrier writes :—

"This would indicate that, if these centres are centres merely of reflex action, the reaction is that of a machine possessing in some way *the power of self-adjustment.*"

A "centre" means a ganglion, and is the earliest form of the brain; in fact, it is a brain in miniature.

At page 66, "Functions of the Brain," Dr. Ferrier writes :—

"The spinal cord possesses functions as an *independent*

centre, a knowledge of which is necessary for the exposition and comprehension of the functions of the brain proper. The functions of the cord as a centre are of the same kind as those which we observe in their greatest simplicity in the nervous system of many of the invertebrates. In the ascidians—the ancestral type of the vertebrates—the nervous apparatus consists of a [single] central ganglion, connected with the periphery by two sets of nerve filaments. One set is distributed to a part of the integumentary surface, capable of receiving and being acted upon by external stimuli; the other is distributed to muscular fibres, which on contraction cause diminution of the body cavity.

"Impressions made on the sensory surface are conveyed by the afferent fibres to the central ganglion, whence an impulse is conveyed by the efferent fibres, causing contraction of the muscular fibres. This is a type of what is termed *reflex action*, from the reflection, as it were, through the energy of the centres, of the stimulus to the periphery."

If it be a *type* of "reflex action," then reflex action must necessarily be conscious action. In its single ganglion a patriarch-Ego-cell must necessarily be present, and all the cells are its children, and, to a certain extent, subordinated to it. The organism performs, though on a smaller scale, almost all that is performed by the highest vertebrate. I will quote what Dr. Ferrier (page 119) says of the "abilities" of invertebrates:—

"Invertebrate animals are capable of actions of an *entirely different kind* [Dr. Ferrier's italics] from those of vetebrates deprived of their hemispheres.

"These animals [invertebrates] manifest *a varied spontaneity of action*; they *seek* their food, are *capable of education*, and *learn* to *adapt* their actions so as to seek what is pleasant and avoid that which is painful,—kinds of action which necessarily imply the presence of consciousness, and which, in the case of the invertebrate ascidian, are the outcome of the powers present in a single ganglion."

I return to page 66:—

"The spinal cord of the vertebrate animals may be looked upon in one respect *as only a mere complex form of an essentially similar mechanism* [that of an *invertebrate* animal], and may be regarded as composed of thirty-one connected segments more or less fused together, each segment with its pair of nerves being *a bilateral repetition of the central* [or *cephalic*] *ganglion* with its afferent and efferent fibres [that is, it is composed of thirty-one pairs of miniature brains subordinated to a head 'centre']. In the annulosa [Dr. Ferrier describes a cray-fish, an invertebrate] the segmentary arrangement of the ventral ganglionic chain—*which corresponds to the spinal cord of the vertebrates*—is particularly manifest. Each somite, or body segment, has its own double ganglion with its afferent and efferent fibres; but all are connected with each other and with the head centre [the ganglion containing *the patriarch-Ego-cell*], by what are termed commissural fibres, whereby the individual centres become units in a compound or collective system.

"The spinal cord as *a whole*, and its *individual segments*, are capable of *independent activity*, *similar to that of the ascidian nervous mechanism*, when the cord is separated from the higher centres or the segments from each other."

The reader may perhaps remember Quain's description of ganglia, in which the "cerebral" nature of all ganglia is to a large extent recognised: "These bodies, though of much smaller size and less complex nature than the brain, agree in some respects with that organ in their elementary structure, and to a certain extent also in their relation to the nervous fibres with which they are connected; *and this correspondence becomes even more apparent in the nervous system of the lower members of the animal series.*" Hence we have the term "cephalic ganglia." The single ganglia of the ascidian is its "brain." Recognise the presence in it of the parent-Ego, and we have the brain of man in miniature; and we have no difficulty in understanding

that what is called reflex, mechanical, unconscious action is really conscious and purposive psychological action.

That a nerve-cell forms part of a ganglion deprives it of none of its inherent capabilities, but only modifies its action. A ganglion consists of a parent-Ego and its child-egos, which are subordinated to it, while *it* is subordinated to some higher ganglion, and that ganglion to a higher, till we reach the patriarch-parent-Ego of the whole organism. Every ganglion is an organism which may be compared to the cephalic ganglion of an invertebrate, except that it may be subordinated to some higher ganglion. Every ganglion is a brain more or less developed, as the case may be. It can be "trained" by the patriarch-Ego to act co-ordinately with other ganglia. If a ganglion or a group of ganglia are accustomed to have some of their actions controlled by the patriarch-Ego and that control ceases—as in the case of the frog deprived of its hemispheres and of its patriarch-Ego—then the ganglion or ganglia will act on their own account, and as their desires may dictate. When they do so such action is called Reflex, and is, I think, erroneously supposed to be performed unconsciously.

In the previous volume we noted that every action of any *part* of an organism, or by any organism as a *whole*, has to be effected against the opposition of gravity. It is by our oppositional action against gravity that we first learn the nature of force, of causation, of efforting. Life is one continuous struggle against gravity. During the whole of its existence each cell of the frog has been efforting against gravity. Many are the disagreeable experiences it has had when its efforting has been unsuccessful. In the frog which has been deprived of its hemispheres and of its patriarch-Ego, every cell in every ganglion is conscious of the discomfort of being placed in the unaccustomed position of face upwards. Every cell, every ganglion, every group of ganglia, all are accustomed to effort to change an uncomfortable state. Let us consider so-called reflex actions as consciously purposive.

"In the case of the frog deprived of its cerebral hemispheres, it will maintain its normal attitude, and resist all attempts to displace its equilibrium." Because the egos concerned, having experienced the disagreeable sensation of falling and the consequent painful impact, know what will happen if their balance is disturbed, and purposively effort to prevent it.

"If laid on its back, it will immediately turn on its face, and regain its station on its feet." Because the position was disagreeable.

"If placed on a board, and the board be tilted in any direction, the animal will make the appropriate bodily movements to throw the centre of gravity within the base of support." Because the cells affected know and dread the consequences of falling, and purposively and appropriately effort to prevent it.

"If its foot be pinched, it hops away." Because the cells affected have a rooted aversion to pain, and try to withdraw themselves from its cause.

"If it is thrown into the water, it will swim till it reaches the side of the vessel, and then clamber up and sit perfectly quiet." Because the cells concerned, although they go into water of their own accord at certain proper times, object to the shock of being "thrown in" at an improper time, and remove themselves to a comfortable position. It is one thing to go volitionally into the sea for the pleasure of a bathe; it is quite another thing to be thrown overboard.

"If its back be stroked gently, it will utter loud croaks." Because the action is pleasant to the cells concerned, and consequently it desires its continuance, and does not move.

Here Dr. Ferrier remarks:—

"*Indeed, in many respects it would be difficult to say that the removal of the hemispheres had caused any alteration in the usual behaviour of the animal.*"

"If placed in a vessel of water, the temperature of which is gradually raised, the headless frog will leap out as soon as

the temperature becomes uncomfortably hot." Because every individual cell feels pain, and every cell co-operates in actions the purpose of which is to lift the organism away from the cause of the pain. The same with the frog placed at the bottom of a pail of water; the feeling of discomfort leads to the setting in motion other trained co-ordinated arrangements for moving the organism as a mass. On which Dr. Ferrier cannot help remarking "that there is a *method in its movements.*"

"If an obstacle be placed between it and the light of a window, the frog will not spring blindly against the obstacle when its toe is pinched, but will clear it, or spring to the side."

It has had an ancestral and also a lifelong training to do so. The parent-Ego in similar cases [it still possesses its eyes] has had the existence of the obstacle made known to it by the eyes. The nerve centres of the eyes have themselves had experiences of the pain consequent upon sharp contact with foreign bodies. They simultaneously send messages to the parent-Ego, and to the parts to be moved in order to avoid such contact, and in "leaping the body moves so as to clear the obstacle." In the course of evolution the eyes become so exquisitely sensitive that the approach of danger gives rise to messages of such extreme urgency that the message to the organs to be moved is sometimes executed by them before any message from the patriarch-Ego to the parts to be moved is received by them; the reason of which is, that the message to the patriarch-Ego has to travel first to the patriarch-Ego, which has to receive it, and then to send its message to the parts to be moved; but the message from the eyes to the parts to be moved is sent direct—there is no loss of time; and when the message from the patriarch-Ego *arrives* at the parts to be moved the order has *already been executed.* In some cases, should the patriarch-Ego wish to *inhibit* the motion, it cannot do so, as the reader may prove for himself. Should any one rapidly advance his hand

towards my eyes, without, however, having any intention to strike, I cannot, however much I may wish it, prevent myself from winking, though I know he does not intend to strike. The message from the eyes to the parts to be moved arrives sooner than the message from myself. Is it any wonder that the miniature brains or ganglia of the eyes of the frog deprived of its patriarch-Ego should, through extreme sensitiveness and long training and habit, so act as to "avoid the obstacle placed in its path"? To suppose the act to be performed without consciousness on the part of the eyes and on the part of the organism would be to suppose a wonder indeed!

At page 72 Dr. Ferrier writes :—

"When a drop of acetic acid is placed on the inner side of the thigh of a decapitated frog, the foot of the same side is raised and attempts are made to rub the part. On the foot being amputated and the acid applied as before, the animal makes a similar attempt, but, failing to reach the point of irritation with the stump, after a few moments of apparent indecision or deliberation, raises the *other foot*, and with this attempts to rub the seat of irritation."

Is it possible to suppose that such action can be the result of anything but *desire to get rid of the irritation*? and desire without consciousness is inconceivable.

At page 118 :—

"By a series of ingeniously contrived experiments, Goltz has shown that, even when the limbs of a frog were *so fixed or placed in positions which could never have occurred in its past experience*, the animal, *without its hemispheres, retained the power of adapting its movements in accordance with those unusual and abnormal conditions.* This would indicate that, if these centres are centres merely of reflex action, the reaction is that of *a machine possessing in some way the power of self-adjustment.*"

That is, that the centres concerned are capable of purposive, and therefore conscious, action. Although the frog was

deprived of its patriarch-Ego and of its hemispheres, though it was "fixed in positions which could never have occurred in its past experience," yet the ganglia concerned could so know the locality of the injury, could so vary, so adapt, their action as to reach the cause of the pain and endeavour to remove it. If they were not conscious of the pain, it is beyond belief that these adaptive, purposive, combinative motions could ever be effected. If we are of opinion that every cell is capable of being conscious, that every cell is "permanently" automatic, that every cell is a protoplasmic machine inhabited by a life, a soul, which is the "engineer" who works that machine, that a ganglion is a co-ordinated aggregation of such machines, with a *head* engineer the parent-Ego of the ganglion,—it seems impossible to accept the dictum that animals deprived of their cerebral hemispheres and of the parent-Ego are incapable of "spontaneous action," that their "past experience has been blotted out," that they act unconsciously.

CHAPTER XLIII.

WHY THE CONSCIOUS CHILD-EGOS CANNOT FEED THEMSELVES WHEN DEPRIVED OF THE PATRIARCH-EGO.

BUT there is one thing which neither the frog nor any other animal deprived of its hemispheres and of its patriarch-Ego can do: it cannot either provide itself with food or feed itself, and consequently, though "surrounded by plenty, dies of starvation." As food is the first of all needs, and gives rise to the strongest desires and to the most energetic action, it seems natural to expect that, as the decapitated frog can do so much, it could provide itself with food, or at any rate, if food were present, could help itself. In the "unicellular" organism and in the "colonial" organism, as we have seen, each cell can cater for itself, can feed itself. In the multicellular organism in its lowliest stages—in the "gastrula"—we find there has commenced a great "division of labour" in relation to the taking in of food. In the hydra we saw how the ectodermic or exterior cells of the two-layered tube constituting the animal were devoted to feeling and motion, their peculiar function being that of bringing food into contact with the endodermic cells constituting the interior layer of the tube, and which were devoted to assimilation and nutrition. But there was present a further "division of labour." Surrounding one end of the tube was a ring of small tubular feelers or tentacles, the particular functions of which were to search for particles of food, and, when found, to draw them into the tube, where they came in "contact" with the nutritive and assimilative cells. One of these feelers

or tentacles must necessarily have been the seat of the patriarch-Ego-cell, for the whole organism has descended from that one cell. But the subordination of the total cells to that patriarch-Ego must have been of the very smallest. As all the "feelers" had the same desires, their action would have little "co-ordination," but would be almost entirely "simultaneous." There would, nevertheless, be this difference between the "feelers" and the rest of the ectodermic cells devoted to feeling and motion, that the latter could not perform any of the "catering" functions of the former, though in other respects they might be equal with them. One great result of the struggle for existence and the consequent division of labour and progressive subordination of its children by the patriarch-Ego to the satisfaction of its desires has been, *that the function of providing food for the organism has necessarily devolved upon the patriarch-Ego.* The parent-egos of the nerve centres of touch and taste can be aware only of immediate contacts, and can give to the patriarch-Ego no indications of distance, or other relations to the outer environment. The parent-egos of the nerve centres of hearing and of smell admit, to some extent, of judgments of distance. The parent-egos of the organs of vision can be aware only of colours, relations of position, and distance. *Each of these knows only what concerns itself, has only its own individual experience,* can act only in its own manner, can perform only its own kind of action. *But the patriarch-Ego knows all that each knows,* has had not only its *own* experiences, but has also *all* the experiences that each has had, can at one and the same time touch, taste, smell, hear, and see, can command all the instruments used by the egos of all the ganglia concerned in the performance of the special actions of each sense, and can use singly, can use partially, can combine in the most simple or in the most complex ways, some or all of them in efforting to satisfy either its own desires or the desires of the whole sum of its children, or of portions of them.

The strongest desire is that of food. Food can be procured only outside the organism, from nearer or more distant sources, with less or greater difficulty, and under more or less perilous and more or less rapidly changing conditions. It can be procured only by the varied combined, adaptive action of the cells of the organism except such cells as perform the functions of assimilation and nutrition, and those cells which have to prepare the nutritive food substances brought to them, not only for their own use, but also for the use of all those other cells which have to expend their energies in procuring such food substances, and which sometimes, even with the expenditure of all the psychological and physical labour of the organism, cannot be procured at all.

As the relations of position of food substances to the animal are subject to endless variation; the motions of the animal to obtain such food substances must also be subject to endless variation; the consequence of which is, that the endless adaptations of the parts of the organism, and of the whole organism—often varying from moment to moment—*can be effected only by the volitions of the patriarch-Ego acting on the organism as a whole, or on such parts of it as the continually changing circumstances may require.* They cannot be provided for by any *fixed arrangements*, no matter how complex: hence the loss of the patriarch-Ego involves, on the part of the mutilated organism, inability either to *seek* food, or, if food be present, to bring it into *contact* with the organs of taste; the consequence of which is that, even if "surrounded by plenty," the animal "dies of starvation."

The pigeon, deprived of its patriarch-Ego, "resists attempts to open its beak for the purpose of introducing nourishment, *but should its resistance be overcome, it swallows as usual.* If fed artificially it may be kept alive for months, but if left to *itself* it will die of starvation, like the frog or the fish.

The search for food is the result of the volitions of the

patriarch-Ego. The bringing of food into contact with the organs of taste is the result of the volitions of the patriarch-Ego. The acts which follow contact—mastication, swallowing, descent into the stomach, etc.—are consequent upon the *volitions* of the *nerve centres* or *ganglia concerned.* The pigeon's beak resists attempts to open it *by a force acting from without,* because the nerve centres concerned are accustomed to be acted upon from *within* by nervous impulses, initiated by the patriarch-Ego ; but the resistance being overcome by the person operating, *and the food brought into contact with the organs of taste,* the result is the same as if the beak had been opened through the volitions of the patriarch-Ego. For *the operator has taken the place of the lost patriarch-Ego, and has supplied the stimulus which, in the natural course of things would have been supplied by the patriarch-Ego.*

CHAPTER XLIV.

EFFECTS ON MAMMALS OF LOSS OF THE CEREBRAL HEMISPHERES, OR OF PORTIONS OF THEM.

At page 112 Dr. Ferrier writes :—

"When we pass from the consideration of the functions which the lower centres in frogs, fishes, and birds, are capable of performing independently of the cerebral hemispheres, to the effects of removal of the hemispheres in *animals, we have to deal with phenomena of a more varied character.* We have seen that frogs, fishes and birds, deprived of their cerebral hemispheres, continue to perform actions in many respects differing little, if at all, from those manifested by the same animals under absolutely normal conditions. But *the results in the case of animals are far from exhibiting the same degree of uniformity.*

Page 113.—"When the hemispheres have been removed from a rabbit or a guinea-pig, the animal—*at first entirely prostrate*—after a varying interval begins to show signs of the retention of a capacity for the performance of actions of a considerable degree of complexity. It is observable, in the first place, that *the muscular power of the limbs has become enfeebled to a noteworthy extent.* The muscular weakness is proportionally *much more marked* in the *fore* than in the *hind* limbs. The animal can maintain its equilibrium on its legs, though of a rather unsteady character; and the fore legs have a tendency to sprawl, or to be planted in irregular positions. If the equilibrium is disturbed, the animal is capable of regaining it. If the

hind foot is pinched, the animal will bound forward in the usual manner, until it strikes its head against some obstacle, or until the excitation has exhausted itself.

"A loud sound will cause the ear to twitch, and provoke a sudden start. Colocynth, or some other equally unpleasant sapid stimulus, will cause movements of the tongue and muscles of mastication in all respects resembling those of disgust, with efforts to get rid of the nauseous taste. Ammonia held before the nostrils will cause a sudden retraction of the head, or induce the animal to rub its nostrils with its paws.

"Not merely does the animal respond by certain movements to a pinch or prick of its toes or its tail, *but if the pinch is a little more severe it will respond with repeated and prolonged cries of that plaintive character* with which all sportsmen are familiar who have gone hare or rabbit shooting. . . . If *the animal be left to itself, undisturbed by any form of external stimulus, it remains fixed and immovable on the same spot; and, unless artificially fed, would die of starvation, like the frog, fish, and bird, in the midst of plenty.*

"With the exception of the greater degree of muscular prostration, and the diminished power of accommodation of movements in accordance with sensory impressions in general, and with visual impressions in particular, the phenomena manifested by 'rodents' deprived of their cerebral hemispheres differ little from those already described in 'frogs, fishes, and birds.' . . . *In cats, dogs, and higher animals, the prostration is so great, and there is such interference with motor power*, that *the independent activity* of the lower centres, as far as relates to the maintenance of equilibrium and co-ordinated progression, *practically ceases to exist.*"

The latest researches of science tend very strongly to prove that very large portions of the cortex of the hemispheres consist of *motor centres*—that they are the *instruments*

by means of which the patriarch-Ego acts volitionally upon various parts of the organism. One hemisphere is a duplicate of the other, and their relations to the two sides of the body are such that a stimulus originating in one hemisphere does not lead to action on the same side of the body, but on the opposite side; the cause of which is, that the nerve tracts commencing in, say, the left hemisphere, in some part of their course *decussate* or *cross over* to the right side, and *vice versâ*.

Research has also shown that particular parts or nerve centres of the cortex are the instruments by means of which movements of particular parts of the organism are effected. The proof of which is, that particular parts of the cortex being destroyed by disease or other causes, certain parts of the organism cannot be acted upon by the patriarch-Ego: they are paralysed.

At page 361 Dr. Ferrier writes:—

"The centres for the movements of the limbs in dogs are, as indicated by the electrical reactions, situated in and around the crucial sulcus. When this region is destroyed in the one hemisphere the movements of the *opposite limbs* are at once affected in a very striking manner.

"At first there appears to be absolute paralysis, so that the limbs are powerless to support the animal's weight, and double up under it. Shortly, however, frequently within a few hours, considerable improvement occurs, so that the animal can stand somewhat insecurely, and make attempts to walk. In doing so it generally turns in a circle towards the side of lesion. The limbs, *especially the fore limb*, tend to double up, and the foot is planted awkwardly, resting frequently on the dorsal instead of the plantar surface, and the hind leg is dragged, instead of being lifted clear from the ground in the usual manner. Walking, at first impossible, is soon attempted—the animal tending to fall, and frequently falling over on the side, especially if the movements are at all hurried; gradually, however, the

power and control of the limbs are regained to such an extent that the animal can stand and walk without exhibiting any very noteworthy abnormality on cursory inspection. All this may occur within a few days after the operation. But though it can stand and walk and run, it still continues for a long time very unsteady, and the limbs tend to slip and diverge outwards if the floor is smooth or if the animal turns round quickly. Even this may become less pronounced after the lapse of months, *but no animal ever entirely recovers.*

"The affection with which we have to deal is a *purely motor* one, and the centres or regions in question are strictly motor, but motor in a *special or limited sense*—viz., *psycho-motor*, or concerned in the execution of consciously discriminated or volitional movements proper."

That is, they are movements consequent upon the desires and consequent volutions of the patriarch-Ego. With the destruction of both hemispheres the patriarch-Ego is slain, and therefore there can be no more movements consequent upon its desires and volitions. But with the destruction of only a *part* of the cortex containing the nerve centres for particular motions, such as those for the movement of the limbs in dogs, which have just been described, *the patriarch-Ego is not destroyed, but only deprived of the instruments by means of which it effected such movements.*

At page 358 Dr. Ferrier says :—

"If the destruction invades the whole depth of the cortex the paralysis is of an incurable type."

To return to the previous paragraph, Dr. Ferrier continues :—

"The differences observable as to the effects of destruction of the *cortical centres* in different animals depend on the degree or extent in which conscious discrimination [on the part of the 'patriarch-Ego'] as distinct from automaticity or mere reflex action [or rather on the 'conscious discrimination' of the nerve-cells, whether individual, or the parent-

egos of the ganglia] is concerned in the ordinary modes of activity manifested by the animals operated upon."

Whenever any one speaks of "volitions" they mean the volitions of the *patriarch-Ego*, to whom they restrict the term. I hope I have shown that every individual cell-ego is capable of volition; for, as Professor Foster has said, "every amœba has a will of its own." There can be no "willing" except as the result of desire, and there can be no desire without consciousness.

"It has been shown that entire removal of the cerebral hemispheres operates differently in different classes or orders of animals. . . . In the fish, frog, and pigeon, the removal of the hemispheres exercises little or no appreciable effect on the faculties of *station and locomotion*. . . . In the rabbit the destruction of the hemispheres, *while greatly impairing the mobility of the fore limbs*, does not render equilibration impossible, or destroy the power of co-ordinated movements of locomotion in response to appropriate external stimuli. In the *dog*, however, the removal of the hemispheres renders the animal *completely prostrate*.

"The *independent* organisation of the lower centres is thus seen to *vary* according as we *ascend* or *descend* the animal scale.

"In proportion to the *variety and complexity* of the forms of motor activity of which the animal is ultimately capable, *the longer is the period* necessary for the acquisition of volitional control [by the patriarch-Ego] over the limbs. Many of the lower animals start from birth with all their powers of movement fully organised and capable of being exercised; in most, the period of helpless infancy is *extremely short*, as compared with that of the simian or human young. In these every exact movement is the result of *a long and laborious* process of *education*, even though this is rendered comparatively easy by the previous work of the race inherited in their nerve centres.

"The *more machine-like* or automatic [the reader will, I

hope, bear in mind the 'volitional' nature of the action of a 'conscious, living, *permanently* automatic, machine'] are the movements at birth, *the less the disturbance* created by the destruction of the centres concerned in volitional action [that is, volitional action on the part of the patriarch-Ego]. Hence, in the fish, frog, and pigeon, the removal of the 'cortical centres' has comparatively little effect on the motor powers ordinarily exhibited.

"When voluntary control is speedily *acquired*, or automatically *inherited*, or rapidly *established*, as in the rabbit and dog, the 'centres' of voluntary motor acquisition may be removed without completely or permanently interfering with the powers of locomotion. Locomotion is still possible through the agency of the lower centres, in which this mode of activity is mechanically organised, and may be set in action in response to various forms of external or internal impulse. The more the movements are dependent on conscious discrimination and volitional impulse [*on the part of the patriarch-Ego*], the more marked and enduring is the paralysis resulting from lesion of the centres [or 'instruments' of the patriarch-Ego], of volitional action and registration. Hence the complete and lasting character of the paralysis consequent on destruction of the cortical centres in man and the monkey.

"The experiments of Soltman on young dogs indicate that at birth the cortical motor centres are not fully developed, and do not respond to electrical stimulation before the tenth day of extra-uterine life. In accordance with these facts he has found that extirpation of the cortical centres *before the tenth day* causes no perceptible disturbance of the motor powers, such as invariably ensues when the animal has reached *a more mature* age. The first centres to respond are those for the fore limb, and it is precisely the movements of the fore limb which are most affected by lesion of the motor zone. Up to the tenth day all the movements of the puppy are merely reflex or automatic,

and such as are primarily organised in the *lower centres* [conscious on *their* part, but *not* on the part of the *patriarch-Ego*]. These are unaffected by the removal of the centres of volitional control and acquisition [which the patriarch-Ego has not yet learnt to use], and it is only when true volition [that of the patriarch-Ego] becomes established that destruction of the cortical centres produces the characteristic disorders of movement which have been described.

"And as volition [on the part of the patriarch-Ego] enters more especially into the motor activities *of the fore limb*, so the fore limb is relatively more affected than the others. The degree of development and control over the movements which a puppy reaches *in ten days* or a fortnight are not attained by the human infant under *a year or more*; so that if we estimate the degree of paralysis resulting from the destruction of its cortical centres simply by the length of time required to reach the standard of development, it would be at least thirty times more marked in man than in the dog."

Page 365.—"The limbs of quadrupeds are, as regards the general character of their movements, more like the lower than the upper limbs of man, inasmuch as they are capable of comparatively few independent movements, and as a general rule are exercised *only in alternating or associated* action with each other."

"The independent organisation of the lower centres is thus seen to vary according as we *ascend* or *descend* the animal scale."

That is to say, the less the ascendency of the patriarch-Ego over its children, the less the injury and disorganisation consequent upon its loss. The greater the ascendency of the patriarch-Ego over its children, the greater the injury and disorganisation consequent upon its loss. In the dog the ascendency is great, in the frog it is small. In the frog we have seen that the removal of the hemispheres causes

a certain amount of injury from which it almost immediately recovers, except that it is no longer able to procure food for itself, or, if food be present, to feed itself. In the dog the removal of only a small portion of the cortex of the cerebrum causes an immense amount of injury, from which it never entirely recovers. If the destruction invades the whole depth of the cortex, the paralysis is of an incurable type.

CHAPTER XLV.

FUNDAMENTAL CAUSES OF EVOLUTION PSYCHOLOGICAL.—DESIRES, AVERSIONS, MEMORIES, IMAGINATIONS, THOUGHTS.

According to the theory I am endeavouring to work out, the position of any given animal in the scale is to be determined by the extent and complexity of its nervous system, and the degree of subordination of the child-egos of the organism to the patriarch-Ego. The lowest multicellular animal organism may be represented by the sponge, the highest by man. How has that development been affected? The answer of science is, that it has been effected by a process of evolution arising out the struggle for existence and the survival of the fittest.

But why *should* an organism struggle to live? It can only be consequent upon a *desire* to "live;" and without consciousness there cannot be desire. I believe that the fundamental cause of evolution is psychological—namely, the *desires and aversions* of cells existing as single unicellular organisms, or as multicellular organisms consisting of a patriarch-cell and its more or less subordinated children; and that every cell, without exception—vegetable as well as animal is capable of being conscious; and that the only difference between one cell and any other cell is the difference in the amount of their development.

What are the principal psychological factors in that development? I think they are desires and aversions, memories, imaginations, thoughts.

I have spoken of the primitive great causes of desire as hunger, sex, fitting temperature, and aversion to pain.

In the lowest stage of life, when memory is in its most rudimentary state, the causes of desire must be present, hunger, present temperature, present aversion; I suppose any or all of these occurring arouse consciousness. When they are satisfied, the organism ceases to be conscious.

If the means of satisfying desires were always in contact with the animal—whether unicellular or multicellular—so that between the arising of the desire and the commencement of its satisfaction there should be no interval, and the process of satisfaction were continuous until complete, and desire and consciousness cease together, there will be nothing to call the ability to "remember" into action. But if, when desire for food arises, means of satisfaction are not immediately at hand, there must be a *search* for food materials, there must be some selection of materials, there must gradually arise some *memories* of materials which were quickly found, of materials which were agreeable, of materials which were disagreeable—increase of knowledges, and hence increase of desires, increase of aversions. As memory develops there arises, in addition to *external* causes of action, causes of action which are *internal*, which originate *within*; memories of some kinds of food which were particularly agreeable, and therefore to be specially sought for; memories of others which, being particularly disagreeable, were to be specially avoided; recognitions of localities of such substances when physically presented; memories of them when not present; memories of pains consequent upon, more or less violent contacts and associations of particular circumstances under which such pains were experienced; recognition of them when again occurring, and consequent avoidance; memories of excesses of temperature; memories of danger and of injury from conflicts with other and stronger creatures, and consequent avoidance of them; memories of successful conflicts with weaker creatures attacked and devoured, and search for opportunities for such attack.

But this development of memory, these acquisitions of

knowledge, these continually extending spheres of action, are not equally shared by each soul, each member of the organism. Each child-Ego has the memory only of what specially affects itself: *but the patriarch-soul gathers up into itself almost the total sum of the experiences, the knowledges, the memories of all its children*, and utilises them in efforting to satisfy the continually increasing number of its desires. Being directly or indirectly connected with every one of its children, and having at the very beginning a certain amount of power over each, whenever, in consequence of some favourable conditions, the number of its children is increased, it utilises such increase for the satisfaction of its increasing desires, and simultaneously "structures" and "functions" them. If it be an increase of nerve-cells, its volitional and its sensal powers are increased. If it be an increase of muscle-cells, its power of forcible action is increased. If connected with touch, taste, smell, hearing, sight, its special modes of knowing the nature and state of its outer environment, and consequently of modifying its action upon such environment in such ways as may be most to its advantage, are increased. Its coercive powers over its children are increased, its development is increased.

The ability to be conscious and the ability to remember are the great psychological conditions of development. Without memory, *not only on the part of the patriarch-Ego, but also on the part of its children*, they could not be trained to that conscious co-ordinated action erroneously called reflex and mechanical. Without memory the patriarch could not profit by its own experience, could not gather up into itself the sum of the experiences of its children, by means of which its desires and its ability to satisfy its desires are continuously increased.

With memory commences the development of the imagination, without which the process of evolution would not only be extremely slow but one would think almost impossible. It is hardly too much to say that without imagination—

which I take to mean a new mental arrangement of things already existing and known, and the *foreseeing*, more or less correctly as the case may be, what will be the effects of such new arrangement—there could be no such thing as "adaptation." Adaptation is the more or less successful application of means to a given end. If the end desired be already known, but not the means, I have only to "imagine" the means. If it is a new end, I have to imagine the end first and then the means. If I have seen some particular adaptation of means to an end, and make a similar adaptation, there is no act of imagination,—it is an act of memory only. If I imagine a new adaptation, the carrying out of which needs the help of a hundred men, *they* have no share in the imagination,—they only do what they are directed and trained to do. If they are men accustomed to the kind of work I require to be done, they will need little direction. If they object to the work, I have to use coercion, to break them in, to gradually train them to the doing it. When at length their training is perfect, I am able to leave them to themselves and their foremen, except when I desire to use the effected adaptation as a means to the effecting of some *new* adaptation. "I," the "Ego," am the "imaginer," the "men" are the "*nerve-cell egos*," the "*foremen*" are the "parent-egos" of the "*ganglia*" *concerned*.

Every purposive act necessarily implies *conscious memory* and an act of *imagination*, for that which is "purposed" must be "imagined" *before* it can be *effected*.

This necessary act of *imagination*—which is based upon conscious memory—I think absolutely destroys the mechanical theory of Life. Is it possible for any one to believe that from the time when the sum of atoms constituting the substance of the physical universe commenced those motions and interactions which after the lapse of countless ages eventuated in those aggregations which we call nebulæ, stars, suns, worlds, comets, meteors, any of such motions or interactions were preceded by conscious memory and

imagined purpose? Not till the new power Life appeared, caused to be by the creational causation of God, were there such things as consciousness, desire, choice, memory, imagination, purpose, thought.

I have endeavoured to make clear the great distinction between merely simultaneous action of the egos of an organism and their co-ordinate action. Simultaneous action arises from all the cell-egos concerned desiring the same thing at the same time; their wills coincide. But co-ordinated action is consequent upon the present or past coercive action upon them of the more powerful will of the patriarch-Ego. When the co-ordination is perfect it is because the domination of the superior will is complete. They have learnt to do willingly and habitually what they at first did only on compulsion. At first, as they did not know what they were required to do, they had to be directed by the Ego (the patriarch-Ego); by degrees they need less and less direction.

Actions which are not only amongst those most necessary to the maintenance and well-being of the organism as a whole, but have to be most frequently performed, will the soonest reach complete development, and their co-ordination will be the most perfect: that is, they will under ordinary circumstances need little or even no direction by the patriarch-Ego.

Food being the primary need, and having to be sought for, those co-ordinated arrangements of particular parts of the body the function of which is to move the body from one place to another, will be continually used, and will be very perfect. If the surface be easy to traverse, and if the co-ordination be perfect, little or no direction by the Ego will be needed. If the search for food has to be made over an area continually increasing in extent, and under circumstances continually becoming more difficult and more various, the directing and adaptive action of the Ego will be frequent. If the animal be liable to be attacked

by enemies, the action of the patriarch-Ego upon the special sense-organs of sight, hearing, smell, touch, will sometimes be almost continuous. *The greater the varieties of circumstances and the more rapid their changes, the less the possibility of fixed co-ordination for such action. There will be need for continually varied adaptation.*

The larger the range of desires of the patriarch-Ego, the more various must be the actions and adaptations needed for their gratification. *The higher its development, the greater will be the disorganisation consequent upon its loss. It is to the continually increasing need for rapid and special adaptive actions that the hemispheres owe their origin and growth.*

These considerations will, I hope, enable us to understand and explain some, at least, of the phenomena presented by animals deprived of their hemispheres and patriarch-Ego, and of others deprived only of a portion of the cortex of the hemisphere, and still possessing their patriarch-Ego.

Psychological action leads to various special modes of evolution of the organism. The most important of these are :—

1. The training of the organs of locomotion so perfectly that they can dispense with the action of the Ego, except in so far as its action is needed to start their action.

2. The training of the limbs to correlated alternate action on opposite sides of the body.

3. The development of a neck.

4. The gradual training of the hind limbs to perform all the actions needed for locomotion ; which eventually leads to the changing of the posture of the body from the horizontal to the perpendicular.

5. The training of the fore limbs, thus released from locomotive action, to act as arms, and the further training of that portion of the limb which constituted the paw to perform the functions of a hand.

6. The growth of the cerebral hemispheres as instruments of special psychological action.

These changes are more or less simultaneously effected by the adaptive action of the patriarch-parent-Ego on the gradually increasing number of its children, the cause of such adaptation being continually increasing efforting for the satisfaction of continually increasing desires. Increasing desires lead to new adaptations, new adaptations lead to new desires, and development is progressive.

CHAPTER XLVI.

AMOUNT OF INJURY FROM LOSS OF PATRIARCH-EGO PROPORTIONATE TO DEGREE OF PSYCHOLOGICAL DEVELOPMENT.

In the frog, the psychological development being small, the locomotive development is also small, and there are few developments of "adaptive" action in the limbs individually. Alternative correlated action has not been developed. The action of all the limbs is simultaneous. The body is moved *en masse*, and progress is effected by a succession of jumps. It swims in the same way. One great development consequent upon the gradual perfecting of the special senses is that of a *neck*, by means of which, through the action of vision, hearing, scent, the outer environment can rapidly be observed and actions modified by a greater knowledge of surrounding conditions. The frog has no neck, and its position in the scale is affected by that fact. I suppose one of the most remarkable instances of the triumph of mind over matter is afforded by the elephant. It has an immense body and no neck. It has neither arm nor hand,—it has not even a paw,—but its psychological power is so great that in its efforts to satisfy its desires it has in the shape of its "trunk" developed an amazing instrument which goes far in enabling it to overcome the disadvantages under which it labours. That "serpent-hand" is a marvellous instance of psychological adaptation of means to ends. It is no wonder to find the intelligence of the elephant so great as it is.

The action of the limbs of the frog being almost entirely limited to the functions of jumping and swimming, and the

training to the performance of these functions being perfect, deprivation of its hemispheres, which are hardly developed at all, affects them but little. Once started by the Ego, they go on continuously till stopped by it. But to start their action they need a stimulus, which may come either from the Ego or from some external cause—especially if it be a stimulus which gives rise to pain—which may cause motion, because the pain gives rise to desires in the cells affected to free themselves from the pain; such motion being conscious and purposive.

The frog, however, is capable of at least one adaptive action, which of course is *plus* the adaptive actions needed for locomotion. It makes a kind of nest.

In his work on the "Common Frog," Professor Mivart (page 108) quotes Dr. Günther's description of the frog's nest.

"When I first disturbed the frog from its lair, I found that it had lain in a kind of nest, which I cannot better describe than by comparing it to the 'form' of a hare, with the grass on the edges so arranged that it formed a sort of roof over it."

"One day I poked the frog out of its lair; after two or three jumps it returned to the old spot, and, squatting down upon the grass, by some rapid movement of the hind legs it gathered the grass nearest to it, pressing it to its sides, and bending it over its body so as to be partially hidden.

"In all these operations no material was collected by the animal for its nest, but only the growing grass either pressed down or arranged so as to form a complete retreat."

Now, as there would be no special co-ordination on the performance of this action, it could be effected only by the *direct action of the Ego.* It could not, like the co-ordinated action of the limbs for locomotion, be performed after the frog had been deprived of its hemispheres and its patriarch-Ego. Supposing nest-building and the providing of food for

itself by the frog to be its only non-coördinated actions, and therefore needing the direct action of the patriarch-Ego, then the only difference between a frog *with* its hemispheres and patriarch-Ego and a frog deprived of them would be that the latter could do all that could be done by the former, except building a nest and procuring food.

In the case of the pigeon the psychological development and the consequent physiological development is much greater. It has developed an extremely flexible neck. Its fore legs have been transformed into wings. The hind limbs have been developed so as by themselves to support the body; their motion is alternatively correlated, and the number of co-ordinated arrangements is great. The result of this increased complexity of organisation is, that when deprived of its hemispheres, which are much larger than those of the frog, and of its patriarch-Ego, the injurious effects are much greater.

"It remains as if plunged in profound sleep. It makes no spontaneous movements. Memory and will seem annihilated." None of those "adaptive" actions which were consequent upon the *direct action of the Ego* can now be performed. All those special nervous and muscular arrangements which had been "grafted on" to the co-ordinated arrangements of the lower centres for locomotion, etc., and which influenced, modified, directed, the action of the lower centres, remain unused, inactive. The co-ordinated arrangements cannot start their own action, and like the frog move only in response to some stimulus which, having given rise to some desire in the child-egos so stimulated, is followed by their purposive action. Except when so excited they remain motionless; and it is some time before they can respond to such stimuli. Having been accustomed to the modifying directive action upon them of the Ego which used them for adaptive purposes, it needs time for the co-ordinated lower centres to be able to act independently.

Like the frog without the patriarch-Ego to provide the organism with food, it *starves,—unless some human ego takes the place of the pigeon ego*, and not only provides it with food, but brings it into direct contact with the necessary co-ordinated trained organs. As the Ego of the pigeon is concerned in the performance of a much greater number of adaptive actions than the Ego of the frog, the injury by loss of the Ego is proportionately greater.

In the rabbit, the psychological and consequent physiological development being greater than in the pigeon, the injury inflicted by the loss of the hemispheres and patriarch-Ego is proportionately greater. One very important development has been effected. The fore and hind limbs, instead of moving simultaneously, now move alternately on opposite sides. By this new arrangement the number of motions of which the body as a whole, or parts of the whole, are capable is greatly increased. Its power over its environment and of adapting itself to sudden and various changes are greatly increased. Its special sense of hearing has been greatly developed, and the development of large and movable ears enables it to "listen" with great intensity. In addition to the "co-ordinated" functions of locomotion the Ego makes use of the fore limbs for numerous "adaptive" purposes arising out of the needs of the moment. These actions, being the result of the direct action of the Ego, can no longer be performed after deprivation of the hemispheres and the loss of the Ego. The hemispheres contain those "cortical nerve centres" by means of which these sudden and often-arising adaptations which may be needed for the satisfaction of the desires of the Ego are effected. Both the Ego and the instruments by means of which it worked are lost; and as the special action of the Ego, and the co-ordinated action of the egos of the limbs and the egos of other co-ordinated movements have been performed *simultaneously*, it is some time before

they learn to act *without* the modifying co-operation of the Ego. But as their organisation for locomotion and other co-ordinated actions—movements of the ears, eyes, tail, etc.—still exist uninjured, they, in a longer or shorter time, are able to act as before, *but not so well.* For though they are no longer stimulated to action by the patriarch-Ego, they may still receive stimuli from without, which may excite them not only to the performance of their usual actions, but may, by exciting in them certain states and desires—such as a state of pain and the desire to get rid of it—give rise to special actions in order to satisfy that desire; as when the decapitated frog placed in a bath, the temperature of which is gradually raised till it becomes so painful that the suffering egos make frantic efforts to leap out; or when irritated by contact of a highly irritating acid, even when "tied down in a position in which they could never naturally have been placed," the irritated egos make purposive efforts to remove themselves from the cause of their suffering.

Increased desires give rise to increased efforts to satisfy them. Increased efforts give rise to increased experiences, increased experiences give rise to increased memories and increased power of imagination. These together give rise to increased adaptive power. The struggle for existence gives rise to strenuous use of increased powers. Successful struggle for existence implies higher and more complex nutrition. Higher nutrition implies higher psychological and physiological development and consequent continual increase of experience, memory, imagination, adaptive power. The continuous and cumulative action of these causes implies continuous increase of their number, and we are thus enabled to understand more and more clearly that the cause of evolution is from the beginning, and always, psychological. The life, the soul, the mind, the spirit, the Ego, slowly subordinates the increasing number of its children to the performance of various and increasing

functions,—functions of nutrition, assimilation, locomotion, touch, taste, smell, hearing, sight, continuously increasing in number, variety, delicacy, and complexity. All these the patriarch parent-Ego trains to separate action, or to co-ordinated action. Some it trains to remain quiescent until set in motion by itself, and once started to continue such motion indefinitely till directed by itself to stop. Some it trains to act alone; some it trains to act either alone or in combination with itself; some to act under its own influence alone. The greater the number of its children so trained, the more and more complex and intricate becomes the structure of the organism, and the greater and less remediable are the injuries consequent upon the loss of the patriarch-Ego and of the hemispheres which are the special instruments of its action. In the case of the frog we have seen that the damage to the organism, as an *organism*, resulting from the loss of the Ego and the hemispheres, is so inconsiderable that Dr. Ferrier remarks: "Indeed, in many respects, it would be difficult to say that the removal of the hemispheres had caused any alteration in the usual behaviour of the animal." That is, none of the remaining child-egos of the frog having lost any of their powers, any of their co-ordinated organisations may for a short time survive, and, if stimulated, may still perform their functions, but the sentence of death has been passed. They can neither provide themselves with food nor, if provided, take it into the organism, and so must die of starvation. Without the Ego their powers are almost useless. In the case of the human being, the complexity of the organism and its dependence on the Ego is so complete, that removal of the hemispheres at once causes death.

In the dog and the cat we find an immense psychological and physiological advance, and especially in the direction of emancipation of the fore limbs from the function of locomotion, and their devotion to the direct service of the

Ego; consequently the injurious effects of removal, not of the whole hemispheres, but merely of removal of certain of the cortical motor centres, are especially manifested in the fore limbs.

At page 370 Dr. Ferrier writes:—

"The so-called recovery which occurs in dogs after the destruction of the cortical motor centres extends only to the brute forces of the limbs and to such movements or muscular combinations as are primarily or secondarily organised in the lower centres [the co-ordinated combinations of child-egos for the purpose of locomotion], and require no conscious discrimination [that is, no direct action of the Ego] in their accurate performance. Even these are permanently unstable and awkward, and capable of being effected only under favourable conditions. Equilibrium is easily overthrown, the limbs slip and double up on a smooth floor, or trip up over comparatively slight inequalities, and are incapable of that quick adaptation which characterises a normal animal under similar conditions. For all purposive action implying conscious discrimination [or direct action of the Ego] the limbs are permanently paralysed. The dog can never use its paw as a hand. It cannot use the limb to dress its coat, or reach it forth to seize a piece of food lying just beyond its muzzle, like a normal dog when tied up. It cannot fix or steady a bone which it wishes to gnaw. If it has learnt to give a paw at the word of command, it looks distressed and sorrowful and fails to comply with the order. In respect of these, and all actions and tricks in which the limb is employed *as an instrument of volitional purpose*, the dog remains hopelessly paralysed."

The Ego is still present, but the "cortical motor centres," the instruments by which it acted on the fore limbs, being destroyed, the actions can no longer be performed. The *lower centres* are still present, and to a certain extent are still able to act. But they have been so accustomed to the

action upon them of the Ego for special purposes, that it is some time before they are able to act upon their own account, and when they are able to do so, can, at the most, act only in the imperfect manner described by Dr. Ferrier.

The application of the above to the solution of the problems of Insanity is, I think, sufficiently obvious.

CHAPTER XLVII.

MAN EXISTS FOR THE SELF-ACQUIREMENT OF KNOWLEDGE, AND THE SELF-EVOLUTION OF JUSTICE AND LOVE.

In order that we may appreciate the psychological advance attained by the cat, and the consequent power of the patriarch-Ego to use the co-ordinated arrangements of the organism as instruments for the satisfaction of desire, I will cite a case from Dr. Romanes' delightful work on "Animal Intelligence," a book which ought to be read by every one, whether big or little.

At page 420 Dr. Romanes says :—

"My own coachman once had a cat which, certainly without tuition, learnt to open a door that led into the stables from a yard, into which looked some of the windows of the house. Standing at one of these windows when the cat did not see me, I have many times witnessed her *modus operandi*. Walking up to the door with a most matter-of-course kind of air, she used to spring at the half-hoop handle just below the thumb latch. Holding on to the bottom of this half-hoop with one fore paw, she then raised the other to the thumb-piece; and, while depressing the latter, finally with her hind legs scratched and pushed the doorposts so as to open the door. Precisely similar movements are described by my correspondents as having been witnessed by them."

At the end of the work Dr. Romanes gives a most wonderful account of the intellectual abilities of a monkey, which he kept in his house for some time for the purpose of

studying the extent of its psychological development. At page 490 he writes :—

"To-day he obtained possession of a hearth-brush, one of the kind which has the handle screwed into the brush. He soon found the way to unscrew the handle, and having done that he immediately began to try to find out the way to screw it in again. This in time he accomplished. At first he put the wrong end of the handle into the hole, but turned it round and round the right way for screwing. Finding it did not hold, he turned the other end of the handle, and carefully stuck it into the hole, and began again to turn it the right way. It was of course a very difficult feat for him to perform, for he required both his hands to hold the handle in the proper position and to turn it between his hands in order to screw it in, and the long bristles of the brush prevented it from remaining steady or with the right side up. He held the brush with his hind hand, but even so it was very difficult for him to get the first turn of the screw to fit into the thread ; he worked at it, however, with the most unwearying perseverance until he got the first turn of the screw to catch, and he then quickly turned it round and round until it was screwed up to the end. The most remarkable thing was, that, however often he was disappointed, he never was induced to turn the handle the wrong way ; he always screwed it from right to left. As soon as he had accomplished his wish he unscrewed it again and then screwed it in again, the second time rather more easily than the first, and so on many times. When he had become by practice tolerably perfect in screwing and unscrewing, he gave it up and took to some other amusement. One remarkable thing is, that he should take so much trouble to do that which is of no material benefit to him. The desire to accomplish a chosen task seems a sufficient inducement to lead him to take any amount of trouble. This seems a very human feeling, such as is not shown, I believe, by any other animal. It is not the desire of praise, as he never notices people

looking on; it is simply the desire to achieve an object for the sake of achieving an object, and he never rests nor allows his attention to be distracted until it is done. . . . He can now open and shut the folding shutters of the window with ease, and this seems to be an amusement to him. He has also unscrewed all the knobs that belong to the fender. The bell-handle beside the mantelpiece he likewise took to bits, which involves the unscrewing of three screws."

Page 497.—"In conclusion, I should say that much the most striking feature in the psychology of this animal, and the one which is least like anything met with in other animals, was the tireless spirit of investigation. The hours and hours of patient industry which this poor monkey has spent in ascertaining all that his monkey-intelligence could of the sundry unfamiliar objects that fell into his hands might well read a lesson in carefulness to many a careless observer. And the keen satisfaction which he displayed when he had succeeded in making any little discovery, such as that of the mechanical principle of the screw, repeating the results of his newly earned knowledge over and over again, till one could not but marvel at the intent abstraction of the 'dumb brute'—this was so different from anything to be met with in any other animal, that I confess I should not have believed what I saw unless I had repeatedly seen it with my own eyes. As my sister once observed, while we were watching him conducting some of his researches, in oblivion of his food and all his other surroundings, when a monkey behaves like this, it is no wonder that man is a scientific animal."

No wonder indeed, for to the question, "Why does man exist?" I answer, "Man exists for the self-acquirement of knowledge, and the self-evolution of justice and love."

Man does not *descend* from the monkey, but is built upon him, *ascends* from him. Man is the last and highest result of a succession of causes which had their first beginning in

that Creational Causation of God which manifested itself in the causing to be of that aggregate of atoms which composed the primal nebula, out of which gradually arose its aggregation into the bodies which compose our solar system. The number, kind and relationship to one another in place of the primeval atoms was not a matter of chance, but a purposive arrangement intended to produce certain combinations and successions of combinations such as should result in the formation of the proper conditions for the existence and development of the power Life which was to be added to the powers already existing, and the gradual development of the abilities of that power Life in the direction of the self-acquirement of knowledge and the self-evolution of justice and love.

We have, up to a certain point, studied the causes which have led to such development, and the conditions under which it has been achieved. These conditions are the various and varying physical circumstances in the midst of which the succession of lives have existed. The causes have been the psychological efforting of each Life to adapt these varying circumstances to itself, and itself to them, whether living singly as a unicellular organism, or as an aggregate of many lives acting together as a multicellular organism, consisting of a patriarch-parent-Life and its more or less subordinated children. The psychological action of lives too numerous to be able to satisfy their desires under the ordinary conditions amidst which they exist, leads to a struggle for the means needed for such satisfaction, the survival of the fittest, and the destruction of the weak.

The psychological factors exercised in that struggle are the ability to be conscious or to feel, to choose, to remember, to imagine, to adapt, to think. One remarkable result of the conflictional exercise of these abilities has been the slow training by successive patriarch-egos of larger or smaller aggregates of their child-egos to the performance of various functions, at first with, but finally without, supervision and

direction, though always remaining subject to direction—except in a very few cases—and of also using these co-ordinated organisations for special purposes which could be effected *along* with those other purposes which led to such co-ordinated organisation.

As these co-ordinated organisations can act independently of direction by the patriarch-Ego, and can commence action from some stimulation *other* than that of the patriarch-Ego, it is supposed that such action is merely mechanical.

I have endeavoured to show that such action is not merely mechanical, but conscious and volitional; and have given my reasons for coming to the conclusion that a multicellular organism consists of the patriarch-Ego and its child-egos, and that its children are more or less subordinated to its service and use; that every child-ego is, like its parent, capable of being conscious, and is essentially similar in nature to the patriarch-parent-Ego.

CHAPTER XLVIII.

THE OPINION THAT MAN IS A LIVING MACHINE, INCAPABLE EITHER OF GOODNESS OR BADNESS.

THE Life or Ego of which an individual consists is variously designated as a soul, a mind, a spirit, according as it is thought of in various states of development. To myself the "soul" means that state of an ego in which sensation is the principal cause of action; the "mind" as that state of development in which intellectual action, or action which results from thinking or thought, is largely present; the "spirit" as that state of development in which action is affected by considerations of right and wrong, of benevolence or malevolence. The least developed lives or egos are moved only by sensation. As development advances, more or less intellectual action is added to that which arises from sensation alone. In the highest Life or Ego—that of man—to action from sensation and intellection or thinking or thought is added that particular exercise of intellection which results in what we call moral judgments, or the attributing to actions the qualities of rightness or wrongness. In any state of evolution in which there is present no moral judgment, no conception of right or wrong, no action is prohibited, no action is commanded. If the desires of one life conflict with the desires of other lives, a struggle ensues and the strongest conquers. As in such a state there is no reason why any life should prefer the satisfaction of the desires of another life to the satisfaction of its own desires;

as each and every creature is entirely selfish; as the conditions of existence are such that the desires of all cannot be satisfied,—the result is that oppression and destruction of the weaker by the stronger, that frightful spectacle of universal selfishness expressing itself in universal and relentless cruelty and slaughter, which the Creator of things has ordained shall be the condition of psychological and physiological evolution. *But not the everlasting and unchangeable condition of evolution.*

Even from the beginning there was certainly present at least one unselfish element—the unselfishness of parents in relation to their immature offspring. But such unselfishness endures in each particular case for only a very brief period. So soon as the child arrives at maturity, the love of the parent—which gives rise to no gratitude in the child—ceases.

In the postulate I have advanced—that the object of man's existence is the self-acquirement of knowledge and the self-evolution of justice and love or benevolence—I place the acquirement of knowledge first, because the foundation of morals is intellectual. The desire for knowledge may be said to be to some extent present in all animals, but it is present in most of them not as the result of a conscious desire, but arises accidentally in endeavouring to capture prey or to escape from danger. In the account given by Dr. Romanes of the persevering and finally successful efforting of the monkey to screw the handle into the brush we have an instance of the desire for knowledge, not for any benefit to be derived from it, but merely *for the sake of knowing.*

The history of morals is the history of the slowly increasing development of the ideas of justness and benevolence and their application to human actions. The essence of rightness is justness. The essence of wrongness is unjustness. Every kind of wrong, from the smallest to the greatest, is some form of unjustness. The whole of man's *duty* is to be

just. It is my duty to be just: that is, I must pay to every one, individually and collectively, what I owe them—which is the positive side of duty; the negative side being, that I must not take from any one—either by fraud or by force, or by taking advantage of circumstances—what does not belong to me. To pay what I owe is justice; to withhold payment due from me, or to take what does not belong to me, is robbery.

It is my "duty" to be just. It is my *privilege* to be benevolent. Love does not pay—it gives.

Suppose every one availed themselves of the privilege of being benevolent, what an incalculable increase there would be in the sum of human happiness!

Why do men not pay what they owe? Why do they not give? They do not "pay"; they do not "give," and they *do* rob because they are selfish. Moral evolution is the gradual conquest of Selfishness by Justice and Benevolence. Life necessarily began with entire selfishness. Will it ever become entirely Unselfish, entirely Just, entirely Benevolent?

How many millions of years have elapsed since God created the first life? How many thousand of years have elapsed since man was evolved? His progress in the acquirement of knowledge has no doubt been great, and is every day increasing. Is that increase of knowledge synonymous with increase of justice, increase of benevolence, increase of happiness? Intellectual development has been great: has moral development kept pace with it? Are we, morally, much in advance of the creature described by Dr. Romanes, who commenced his career with the four "paws" of his ancestor converted into four imperfect "hands"? The intellectual difference is great, but what is the difference in point of morals between the barbarous African—still in that lower state of evolution in which actions are dominated much more by sensation than by thought—and the civilised white trader who sells to him that horrible liquid compound of poison and fire which arouses into furious action every

evil principle in his nature—from lust and cruelty up to homicidal madness, and which finally and quickly ends his existence by a miserable death? Judged from the standpoint of morality (justness and benevolence), which is the superior being,—the ignorant negro, or the civilised, the cultivated European? In answer to this question it may be remarked that *intellectual power is in itself neither good nor bad*; whether it shall be a blessing or a curse depends upon its application—upon the good or evil purposes it is made to serve.

The pessimist will say,—"If we look at home what do we see? Bogus companies; gambling under the name of legitimate trade; the cruelties of merciless competition; employers of all descriptions taking advantage of over-supply of labour to beat down wages to such a point as shall give to the worker a bare existence—or even less, and the labourer endeavouring to give as little work for his pay as possible; every one striving to get the better of his neighbour, to profit by his weakness or his ignorance. If you assert that the object of man's existence is the acquirement of knowledge and the evolution of justice and benevolence, he has not made much progress in the latter, whatever he may have done in the former—especially if you take into consideration the immensely long time it has taken to effect that little progress. If God wanted man to be just and benevolent, why did He not make him so at the beginning, instead of by processes of evolution so slow and also so cruel as to need the lapse of millions of years and the sacrifice and death of countless millions of lives; involving an amount of pain and misery still more incalculable, and for the most part apparently ineffectual? For, supposing a time *should* come when every person will be good and happy, *what is to be said about those who have been sacrificed during the process, and from the consummation of which they will receive no benefit?* To the wretched creature who lives a life of toil and suffering, whose existence is simply another name for slow

death by starvation, whose only variety consists in different degrees of misery, what comfort is it to be told that his misery is one of the necessary conditions for the attainment of that blessed state, that blessed time, when all will be happy and when all will be good. You say that 'Duty is but another name for justice,' and that to be 'benevolent is a privilege.' Can the wretched creature of whom we are speaking discover in his own state, and in the conditions in the midst of which, and because of which, his existence is deprived of all happiness, any signs of either justice or benevolence in the Being who caused him to be? If God is just and benevolent, how can justice and benevolence be reconciled with misery and wickedness? Why were men not *created* good and happy? What is the use of all this expenditure of time, all this waste of life, this waste even of wickedness? If we could be happy by being wicked, then this wickedness would at least be useful, but we are not happy. It is in vain we ask what is the meaning of it all? It would seem that the only meaning of it is that it has no meaning, and that its almost entire outcome is waste and uselessness. It cannot be denied that there is some, even much goodness, much even of happiness; but compared with the sum of wickedness and misery they seem as nothing, and again we ask, Why did God when He made man not make him happy and good?"

This question takes for granted that God is *able* to make man "good." *Can* God *make* a good man, or any kind of "good" being?

It is quite conceivable that God could make an *innocent* being who should also be a happy being; a being not only innocent and happy, but of such a constitution and character, and under such conditions, as to be *incapable* of either badness or unhappiness. But such a being would also be incapable of *goodness* as well as incapable of *misery; for the nature of virtue is such that no person can be virtuous*

except by his own acts, and that such acts must be absolutely free acts, and must be untainted by selfishness; *for the essence of virtue is the conquest of selfishness.* If I act in a way which would technically be called virtuous, and my motive for so acting be either hope of reward or fear of punishment, the acts are merely commercial transactions. They are not virtuous, for they are essentially selfish; moral merit arises out of the conquest of selfishness. But if the conquest be effected for the sake of the merit, then *it* also is not virtuous, *it* also is a mere commercial transaction: so much difficulty overcome, so much merit; the account is squared. If a being were so made that he would always and necessarily act goodly or virtuously, he would not be good at all; his acts would not be his own, but the acts of the being who made him. He would simply be a machine, with moral power put into him from the outside. A fox kills a fowl and devours it; a man kills and robs another man who has never wronged him. We do not condemn the fox for killing the fowl and eating it; we do condemn the man for killing and afterwards robbing the man he has slaughtered.

The pessimist asks—"Why do you judge two similar actions so differently? Why do you acquit the one and condemn the other? What intrinsic difference is there between them? Why should the fox 'innocently' kill in efforting to satisfy its desires, and the man 'guiltily' kill in efforting to satisfy his desires?"

"Because," replies the moralist, "the fox could not have acted differently, while the man not only could, but ought to have acted differently, and not have unjustly robbed the man of his life and of his goods."

"Then," rejoins the pessimist, "if he knew that he ought not to have murdered the man and then robbed him, why did he do it?"

"Because," the moralist replies, "he preferred the

gratification of his selfish desire to kill and to rob, to doing what was right."

"But," says the pessimist, "how could the man, any more than the fox, *help* doing what he did? The man did not, any more than the fox, *make himself*, his *character*, and his *disposition*—out of which desires and the efforting to satisfy them arise. So how can he be blamed, any more than the fox can be blamed? *Both did what they could not help doing.* Surely you are not so simple as to believe in the absurd doctrine of free will,—a doctrine which has been killed so often that one would think it could need no more killing,—*and without free will goodness and badness are alike impossible;* for how can we act otherwise than is consequent upon our constitution, character, and disposition, of which not we ourselves, but God Himself, is the cause? Can you possibly help seeing that we are mere living machines, which, having no free will, are incapable either of goodness or badness? Would it not have been more 'just,' more, 'benevolent,' in God if He had made us happy machines instead of miserable machines, and not allowed us to torment ourselves with baseless reasonings about obligatory goodness which is impossible for us, and which take out of our lives such small enjoyments as might be possible to us? We can act only in accordance with our constitution; and whatever our actions may be, whether they be such as help or hinder the well-being and happiness of ourselves or of our fellows, it is not we who are responsible for them, but God. Goodness or badness, merit or demerit are, for man, alike impossible. In the first part of this work you took a great deal of trouble to prove 'that all things owe their existence to God,' but, even supposing your 'efforting' was 'successful,' I think you cannot be said to have taken much by your motion: you have simply concentrated in God all the evil that has existed, that now exists, that ever will exist. Of the little good accompanying that evil—'this halfpenny-worth of bread

to this monstrous quantity of sack'—we make you a present."

If this reasoning be correct, if there be no such thing as free will, all actions would seem to be necessary, or, as it is now more correctly called, "determined," and consequently there can be no possibility of virtue,—an awful conclusion.

CHAPTER XLIX.

THE ARGUMENT AGAINST FREE WILL.—PROF. TYNDALL, SIR W. HAMILTON, MR. J. S. MILL.

LET us consider the arguments for and against free will, as set forth by Professor Tyndall, Sir William Hamilton, and Mr. John Stuart Mill.

At page 361 of the second volume of "Fragments of Science," in the essay Science and Man, Professor Tyndall writes :—

"What is meant by free will? *Does it imply the power of producing events without antecedents*—of starting, as it were, upon a creative tour of occurrences without any impulse from within or from without? Let us consider the point. If there be absolutely or relatively no reason why a tree should fall, it will not fall; and if there be absolutely or relatively no reason why a man should act, he will not act. It is true that the united voice of this assembly could not persuade me that I have not, at this moment, the power to lift my arm if I wished to do so. Within this range the conscious freedom of my will cannot be questioned. But what about *the origin* of the 'wish'? Are we, or are we not complete masters of the circumstances which create our wishes, motives, and tendencies to action? Adequate reflection will, I think, prove that we are not. . . . As I stated at the beginning of this discourse, my physical and intellectual textures were woven *for* me, not *by* me [Prof. Tyndall's italics]. Processes, in the conduct or regulation of which I

had no share have made me what I am. Here, surely, if anywhere, we are as clay in the hands of the potter."

Page 364.—"If to any one of us were given the privilege of looking back through the æons across which life has crept towards its present outcome, his vision, according to Darwin, would ultimately reach a point when the progenitors of this assembly could not be called human. From that humble society, through the interaction of its members and the storing up of their best qualities, a better one emerged; and from this again a better still; until at length, by the integration of infinitesimals through ages of amelioration, we came to be what we are to-day. We of this generation had no conscious share in the production of this grand and beneficent result. Any and every generation which preceded us had as little share. . . . If, then, our organisms, with all their tendencies and capacities, are given to us without our being consulted,—if, while capable of acting within certain limits in accordance with our wishes, we are not masters of the circumstances in which motives and wishes *originate*,—and if, finally, our motives and wishes determine our actions—in what sense can those actions be said to be free?

Turn we now to Mr. Mill's "Examination of Sir William Hamilton's Philosophy."

Sir William Hamilton believed in the freedom of the will, but that proof of such freedom was impossible—nay, even that free will was inconceivable.

"The inconceivability of the free will doctrine is maintained by our author," says Mr. Mill, "on the further and special ground that the will is *determined by motives*. 'A determination by motives, cannot, to our understanding, escape from necessitation. Nay, were we even to admit as true what we cannot think as possible, still the doctrine of a *motiveless volition* would be only *casualism*; and the free acts of an *indifferent* are morally and rationally as worthless as the pre-ordered passions of a *determined* will."

Page 498.—"According to Reid," Mr. Mill remarks, "the 'determination' is made by the man, and not by the motive. 'But,' asks Sir W. Hamilton, 'was the *man* [Sir W. Hamilton's italics] determined by no *motive* to that determination? Was his specific volition to this or to that *without a cause*? On the supposition that the sum of influences (motives, dispositions and tendencies) to volition A is equal to 12, and the sum of influences to counter-volition B equal to 8, can we conceive that the determination of volition A should not be necessary? We can only conceive the volition B to be determined by supposing that the man *creates* [Sir W. Hamilton's italics] (calls from non-existence into existence) a certain supplement of influences. But this creation (as actual, or in itself) is inconceivable; and even to conceive the possibility of this inconceivable act, we must suppose some cause by which the man is determined to *exert* it. We thus, in *thought*, [Sir W. Hamilton's italics] never escape determination and necessity."

Page 499.—"Now what," asks Mr. Mill, "is the reason which, in the case of all things within the range of our knowledge—*except volitions*—makes us, without scruple, register all of them as depending on causes? Apparently it is because the causation hypothesis possesses the advantage of having experience on its side."

Page 500.—"*What 'experience' makes known is the fact of an invariable sequence between every event and some special combination of antecedent conditions in such sort that, wherever and whenever that union of antecedents exists, the event does not fail to occur . . . and leads us to the belief that every event within the phenomenal universe is determined to take place by a cause.* Now, the so-called Necessitarians demand the application of the same rule of judgment to our volitions. They maintain that there is the same evidence for it. They affirm, as a truth of experience, that volitions do, in point of fact, follow determinate moral

antecedents with the same uniformity, and (when we have sufficient knowledge of the circumstances) with the same certainty, as physical effects follow their causes.

"This is what necessitarians affirm; and they court every possible mode in which its truth can be verified. They test it by each person's observations of his own volitions. They test it by each person's observation of the voluntary actions of those with whom he comes in contact; and by the power which every one has of foreseeing actions with a degree of exactness proportioned to his previous experience and knowledge of the agents, and with a certainty often quite equal to that with which we predict the commonest physical events.

"This argument from 'experience' Sir William Hamilton passes unnoticed, but urges, on the opposite side of the question, the argument from consciousness. 'We are conscious,' he affirms, 'either of our freedom, or at all events of something which implies freedom.'

"Let us cross-examine the alleged testimony of consciousness: whether we are conscious only of moral responsibility in which free will is implied, or are directly conscious of free will.

"To be conscious of free will must mean to be conscious, before I have decided, that I am able to decide either way. But what I am *able* to do [Mr. Mill's italics] is not a subject of consciousness. Consciousness is not prophetic; we are conscious of what is, not of what will or can be.

"But this conviction—whether termed consciousness or only belief—that our will is free, what is it? Of what are we convinced? I am told that, whether I decide to do or to abstain, I feel that I could have decided the other way. I ask my consciousness what I do feel, and I find, indeed, that I feel (or am convinced) that I could have chosen the other course *if I had preferred it* [Mr. Mill's italics]; *but not that I could have chosen one course while I preferred the other*. When I say 'preferred,' I of course include with

the thing itself all that accompanied it. I know that I can, because I know that I often do, elect to do one thing, when I should have 'preferred' another *in itself,—apart from its consequences*, or from a moral law which it violates. And this preference for a thing *in itself, abstractedly from its accompaniments*, is often loosely described as preference for the thing. It is this unprecise mode of speech which makes it not seem absurd to say that I act in opposition to my preference; that I do one thing when I would rather do another; that my conscience prevails over my desires,—as if conscience were not in itself a 'desire,' the desire to do right. Take any alternative: say, to murder or not to murder. I am told that, if I elect to murder, I am conscious that I could have elected to abstain; but am I conscious that I could have abstained if my aversion to the crime and my dread of its consequences had been weaker than the temptation? If I *elect to abstain*, in what sense am I conscious *that I could have elected to commit* the crime? Only if I had desired to commit it with a desire *stronger* than my horror of murder, *not* with one *less strong*. When we think of ourselves hypothetically as having acted otherwise than we did, *we always suppose a difference in the antecedents*; we picture ourselves as having known something that we did *not* know, or not known something that we *did* know—which is a difference in the external motives; or as desiring something, or disliking something, more or less than we did—which is a difference in the internal motives.

"I therefore dispute altogether that we are able to act in opposition to the strongest present desire or aversion."

As it is absolutely impossible to conceive an effect without an antecedent cause, it is unnecessary to recapitulate Mr. Mill's argument that volitions, like all other phenomena, are caused.

The cause of a volition is a motive. A volition without a motive is inconceivable. If the will is "determined"—

not by itself, but by motives,—what becomes of its freedom? Professor Tyndall goes to the root of the matter,—*the origination of motives*. He says:—

"My physical and intellectual tissues were woven *for* me, not *by* me. Processes, in the conduct or regulation of which I had no share, have made me what I am. Here, surely, if anywhere, we are as clay in the hands of the potter.

"If, then, our organisms with all their tendencies and capacities are given to us without our being consulted; and *if . . . we are not masters of the circumstances in which wishes and motives originate;* if, finally, our motives and wishes determine our actions,—in what sense can these actions be said to be free?"

There seems to be only one possible reply. They cannot be free at all.

Sir William Hamilton inconsistently believed in free will—though he believed free will to be inconceivable—on the ground that the will was determined by motives. He thus states the case for necessity:—

"On the supposition that the sum of influences (motives, dispositions and tendencies) to volition A is equal to 12, and the sum of influences to counter-volition B is equal to 8—can we conceive that the determination of volition A should not be necessary?—we can only conceive the volition B to be determined, by supposing that the man *creates* (calls from non-existence into existence) a certain supplement of influences, but this 'creation' is inconceivable, and even to conceive the possibility of this inconceivable act, we must suppose some cause [that is, some *other* motive] by which the man is determined to exert it. We thus, in *thought*, never escape determination' [or necessity].

As Sir William Hamilton's argument amounts—from his point of view—to a demonstration of the non-existence of free will, it is wonderful that, notwithstanding its inconceivability, he should still have believed in free will. The

foundation of his belief was the argument from consciousness. "We are conscious," he affirms, "either of our freedom or at all events of something which *implies* freedom." An argument which Mr. Mill immediately demolishes. He says :—

"To be 'conscious' of free will must mean to be conscious before I have decided that I am able to decide either way. . . . I am told that whether I decide to do or to abstain, I feel that I could have decided the other way. I ask my consciousness what I do feel, and find, indeed, that I feel (or am convinced) that I could have chosen the other course *if I had preferred it*, but not that I could have *chosen one course while I 'preferred' the other*. When I say I 'preferred,' I of course include with the thing itself all that accompanies it. . . . When we think of ourselves hypothetically as having acted otherwise than we did, *we always suppose a difference in the antecedents*. We picture ourselves as *having known* something that we did *not* know, or not known something that we *did know*—which is a difference in the external motives; or as desiring something, or disliking something, more or less, than we did—which is a difference in the internal motives.

"I therefore dispute altogether that we are able to act in opposition to the strongest present desire or aversion."

If we could, then 8 would equal 12, which Sir William Hamilton has himself declared to be inconceivable. A weaker force would conquer a stronger force, which is absurd.

In view of the arguments advanced by Professor Tyndall, Sir William Hamilton, and Mr. J. S. Mill, the only possible conclusion open to us is, that free will is not only impossible but inconceivable, for we cannot even *suppose* a volition without a motive. The motive must thus be the antecedent or cause of the act of the will, and must determine it; and as our desires, which are the causes of our motives, arise out of our constitution and character, which we did not give ourselves, which were made *for* us,

and not *by* us—it is clear that the Causer of our character and constitution so arranged things in the beginning that no acts of any existence, whether living or non-living, could be other than they have been, other than they are, or other than they will be. Everything is "designed," is subject to absolute necessity—such necessity being the will of the Creator who caused them to be ; hence goodness or badness are for man alike impossible.

CHAPTER L.

FREEDOM DOES NOT DEPEND ON FREE WILL, BUT ON FREE OR SELF-CREATED MOTIVATION.

I CANNOT find any flaw in the reasonings which lead to this dreadful conclusion. But though there be no flaw in the reasonings, there may possibly be some inaccuracy—some defect—in the premises on which they are based. For instance, there is a great ambiguity in the term the will, which seems to mean a separate entity distinct from the Ego. It is said, "the will can do this," "the will cannot do that," whereas the fact is that there is no such thing as "the will." Will is not a noun; it is a verb—the verb to will. To will is a faculty of the Ego. The will is, in fact, only another name for the "Ego," the "I," the "me," the "myself." I no more possess a "will" than I possess a "jump," than I possess a "myself:" I *am* myself; but I can perform the *act* of jumping and I can perform the *act* of willing. When we say a man has a strong will, we mean that he can "will" strongly; which leads us to inquire,—How did the motive which determined his willing, which determined the action, *originate*?

I quoted Professor Tyndall where he says,—

"If there be absolutely or relatively no reason why a man should act" [that is, if he has no *motive* for acting], "he will not act. It is true that the united voice of this assembly could not persuade me that I have not, at this moment, the power to lift my arm if I wished to do so. But what about the *origin* of the wish? Are we, or are we

not, complete masters of the circumstances which create our wishes, motives and tendencies to action? Adequate reflection will, I think, prove that we are not."

It needs no reflection, or only a moment's, to prove that we are *not* "complete" masters of the circumstances which create our wishes, motives and tendencies to action. The question is,—Am I master of *any* of the circumstances which create my wishes, motives and tendencies to action? The question of free will—which we have just discussed—is a foolish question, for a very brief examination has shown us that what is called free will, or in other words action without a motive, is inconceivable. The real question is a question of causation,—Do *I*, *myself*, "cause" any of the "motives" which give rise to my "volitions," which give rise to my "actions," or do I not?

The causes or motives of my actions are past or present sensations, memories, imaginations and thoughts, or combinations or successions of them. What share have I myself in originating or causing them?

I certainly do not cause my sensations. *They* are certainly caused *in* me, not *by* me. When I experience a sensation I do not act, I am acted upon. Any sensation giving rise in me to a desire which causes me to act in some particular way or ways to satisfy that desire is the *cause* of such action, inasmuch as it gave rise to the motive which gave rise to the willing of the action performed for the purpose of satisfying the desire which the sensation originated. I am so constituted that the action upon me of a certain substance or substances causes me to experience a sensation. I am so constituted that the sensation experienced causes in me a desire. I am so constituted that when I experience a desire, that desire gives rise to *another desire*—namely, *a desire to act in some way which, I think, will tend to the satisfaction of the desire* caused by the desire which was caused by the sensation. The "second" desire—the desire to act in some way which will tend to the satisfaction of

the "first" desire, which first desire was caused by the "sensation"—we call the "*motive*" of the act performed. Thus we see that the sensation is the real cause of the action. My constitution and character—in the formation of which I had no share, and for which I am consequently not in any way answerable—are such that I cannot help feeling the sensation; are such that I cannot help the desire arising in me; are such that I cannot help desiring to have that desire gratified; are such that I cannot help acting or performing actions having for their object the gratification of the desire. My own constitution and character and the constitution and character of that which acted upon me being such as they are, determine the action of that which causes the sensation in me, and the effects which such sensation shall produce; and it is perfectly clear that they could not have been other than as described; and we have a typical illustration of the doctrine of necessity or determinism. All the conditions which determined what should be the nature of the sensation, and all the conditions which determined what should be the effects of the sensation, *were already existent before the sensation and its effects were produced.* It is true that I acted from a desire, a motive; but I had no more share in determining what that desire which was to be my motive for action should be, than a stone held in my hand has in determining what it will do when I open my hand and let it fall. It falls as it does fall because its Creator so constituted *it*; just as He has so constituted *me* that a certain external action upon me shall cause a sensation, which shall cause a desire, which shall cause another desire to act in such a way as shall cause in me what I call the gratification or satisfaction of the first desire.

Now, if the falling stone had present in it some power by the exertion of which it could retard its fall, or accelerate it, or stop it altogether,—a power which it did not originally possess, but only the power to originate that power,—then

we might say that it, itself, caused the retardation, the acceleration, the stoppage. It would *originate* such action.

To which it may be objected—"That in such case you only shift the determinism a step backwards. For the power present in the stone to originate that power to retard, to accelerate, to stop its motion leads to determinism, to necessity, just as much as the absence of such power. The power of the stone to fall uninterruptedly, and the power to evolve the power to modify such falling, are alike due to the Creator of the stone."

If I had said all I have to say, the objection would be insuperable, but I have not quite finished. I am endeavouring to frame some hypothesis by means of which we may escape out of the seemingly unbreakable chains of necessity.

We must endow the stone with consciousness. It must be capable of desire, of acting from motives. It must be capable of desiring to retard, to accelerate its motion, to stop it altogether—nay, to change the direction of its motion from that of falling to rising.

The stone which we have endowed with consciousness is so constituted that its natural motion is downwards. We will suppose it resents any retardation of its downward motion, and that any retardation gives rise to resistance of such retardation—which resistance, when successful, accelerates the downward motion. We will suppose that in Nature external to it, in the total of its environing circumstances, there exists nothing which can give rise in the conscious stone to a desire to retard that downward progress which is natural to it; and that any desire to retard its downward motion *can originate only in itself*. That under these conditions there should arise any desire to *retard* its natural downward motion—let alone to reverse the direction of its motion from downwards to motion upwards, seems impossible.

For the conscious stone let us substitute a human being.

The natural downward motion is selfishness. The force

of which the downward motion is the result, is the expression, is *Selfishness*. The force of which the retardation is the expression is *Justice*. The force of which the upward motion is the expression is *Love, added to Justice*.

The absolute condition of virtue or goodness is, that it must be self-caused. It is possible only to a being capable—not of free will, which is nonsense—but *capable of free or self-originated motivation*.

The absolute condition of vice or badness is, that, like virtue, it must be self-caused. It is possible only to a being capable of free or "self-originated motivation."

"Sir," says some reader, "do you know what you are asserting? Why, self-origination of motive means—creation! which, according to your own definition, means, causing something to begin to be. You objected to Dr. Flint's alleged instances of 'creation,' that they were merely examples of 'changeal' causation—which is nothing more than changes of relation between things already existing, not creation—which you affirmed to mean causing something to begin to exist; and from the fact that there was once no Life, and that as no action or interaction of existing forces could account for the first appearance of Life, we must infer that, as Life could not create itself, there must exist some being who created that is, caused it to begin to be, and whom you called God. Do you seriously assert that man, like God, possesses "creative power," and can cause something to begin to be?

"I do."

"And what is it that he creates?"

"Thoughts."*

I do not create my "sensations;" they are effects produced in me by causes external to myself; the minute mass of protoplasm which I inhabit being as "external" to me as

* At page 156 of "Whence comes Man?" the reader will find the nature of thought discussed.

the sun is. But my thoughts are originated by myself—I "create" them. Justness, for instance, is not a thing,—it is a thought about actions, created by myself. It is the opposite of injustice. If I "create" the thought "justness—unjustness;" if my thinking about justness results in my thinking "oughtness"—that is, that I am bound to be just; if selfishness, which is natural to me, which I do not originate, gives rise in me to a desire which cannot be gratified without my acting unjustly—such as coveting my neighbour's wife, or his house, or his ox, or his ass, or anything that is his; if my desire cannot be gratified without stealing, murdering, lying, and I abstain from the act *because it would be unjust, and because I ought not to be unjust*, why, then my *motive*—which is to act justly—is self-caused, is created by myself: I am myself the cause of my virtue. By my own act the downward motion of selfishness is retarded, gradually stopped; and the downward-moving force selfishness being overcome by the upward-moving forces of justice and love, these forces, no longer opposed by selfishness, rise—rise—rise; and to what moral elevation the human creature may rise as the force selfishness is gradually more and more weakened while justice and love are gradually more and more strengthened, time alone can show.

If the power to retard the downward motion of the stone, to stop it, to change its direction to upward, were *put into it* by something not itself, such change of direction would be due, not to the stone, but to that which infused into it the necessary force. So in the man. If I act virtuously from some cause external to myself—fear of punishment or hope of reward—I act from self-interest, and my act is not truly virtuous. If I am tempted to steal my neighbour's ox, and abstain because I think I cannot steal it without being almost certainly found out and punished,—if I am tempted to steal my neighbour's ox, and abstain because I think it would be unjust, would be wrong,—the first cause of abstention is not virtuous, but merely selfish; the second is truly

virtuous. Now, if I can "think" of the same act as virtuous and as not virtuous, while I cannot "think" that blue is at one time yellow and at another time is blue, or that yellow is at one time blue and at another time yellow, *it is because the difference between blue and yellow is not caused by me,* but is a *sensation—which I do not cause,* while the goodness or badness of an action *is the result of my thoughts—which I create.* That 2 and 2 are 4 is not consequent upon my creative act, while virtue and non-virtue are. Without thought there is neither virtue nor vice. That in the two abstentions from stealing, one abstention is not virtuous while the other is virtuous, *is a difference created by my thought.* If, not having a sufficiently developed idea of justice to know that it is wrong to steal, I steal the ox, I do not do wrong (unless I *ought* to have had a sufficiently developed idea of justice). If, *having* a sufficiently developed thought of justness to know that it is wrong to steal, I *do* steal, preferring my own interest to my neighbour's rights, I do wrong.

Two men, one of whom is enthusiastically devoted to Botany, while the other rather dislikes Botany than otherwise, are present at a lecture—say on the upward movement of water in plants. At its termination one remarks, "The lecture has lasted a dreadfully long time—an hour and a half." "An hour and a half," says the other: "why, to me the time has been very short, the lecture was so interesting." Now, if the one "thinks" the time long, while the other "thinks" the same time short, the shortness and the longness must have been *created* respectively by the one and the other. Longness and shortness have no other existence than as thoughts. In creatures incapable of thinking, right and wrong, justness and unjustness, are impossible; and whatever unjust actions they may commit we do not consider them to have done wrong. The first Life was capable only of sensations. From the amœba up to man no creature was capable of wrong or of right; for we cannot be capable

of either without being capable of both. When I say "man," I mean that not till psychological development had reached the state in which thought, or the conception of oppositions, had become possible, were right or wrong possible. It was such development that constituted what we call man.

There was a time when there was no Life. Life appeared. It could not create itself: it must have been *created* by some being having the power to create it. That power we call God.

There was a time when there was no thought. Thought appeared. It could not create itself: it must have been *created* by some being having the power to create it. That being was man, to whom God has given that power

CHAPTER. LI.

CREATION OF THE CONCEPTION JUSTICE.—ITS APPLICATION TO ACTIONS.—SELF-ORIGINATION OF MORALS.

JUSTNESS is the application of the conception equalness to human actions.

Until the human creature has evolved the conception of justness, every creature, being entirely selfish, does to another *whatever* it desires and is also able to do. Gratification of desires, regardless of accompanying pain and injury to others, is the sole motive of action. Man is a combination of the "ape and the tiger." Possessing the ability to think, capable of continually extending application of means to ends, he is consequently more dangerous than any other creature. But being capable of thought, the conception of justness is possible to him.

In the beginning, man—or rather, the creature who was to become man—being injured, cries out and seeks revenge, and in seeking revenge endeavours to inflict, not a quantity of pain equal to the pain he has suffered, but as great an amount of pain as possible. We will suppose a great revenge has been taken by one tribe for a small injury inflicted upon it by another tribe. Some great soul amongst the conquerors—great considering man's psychological development at the time—might "think" how disproportionate, how "unequal," was the pain of the injury sustained by his tribe to the pain inflicted by its revenge. If no one had ever before conceived *that thought of inequality*

in relation to pain suffered and pain inflicted in revenge for that suffering, we should have the *first conception of justness and unjustness.*

When the idea of some degree of equalness between the pain suffered by the injured and the pain inflicted in revenge begins to modify—in however small a degree—the amount of pain inflicted in accomplishing such revenge, revenge begins to have present in it some element of justice. So long as the amount of pain inflicted had no limits other than the power of the avenger, there was only retaliation or revenge. In the conception that there should be *some proportion* between injury suffered and injury inflicted in return for such suffering, we have the conception of justness and unjustness, we have the beginning of morals, for morality is founded upon justice, or rather *is* justice: a conception not derived from any external source, not resolvable by any conceivable analysis into some subtle form of selfishness (for justice is *always opposed* to selfishness), not imparted to man, not discovered—*for there was none to discover*—but *self-originated, created by himself.* Goodness and virtue have become possible.

But as human, like all other creatures, are by nature selfish, and prefer their own pleasure and happiness to the pleasure and happiness of others, although the conception of justness may make goodness or virtue possible, how does it cause the merely possible to become the actual? A man may have a very clear conception of justness, but the having that clear conception may not prevent his acting unjustly—as indeed why should it? If in gratifying a given desire I cause my neighbour pain which he does not deserve—what is that to me? why should I *not* cause my neighbour pain? *Because* it is unjust; because it is your duty to abstain from acting unjustly. But what is justice to me, that I should forego a gratification for its sake? You infer an obligation—what you call a "duty:" how does that obligation arise?

I will answer, and you shall judge. You have no doubt heard of the Golden Rule of duty—" Do unto others as ye would that they should do unto you,"—a rule which is found present in some of the earliest recorded histories of man; from which we may infer that at a very early period man conceived the thought of justice, and formulated the idea as a rule of life. It also shows that though the *conception* of justice is easy, its *practice*, seeing how much injustice exists at the present moment, must be very difficult. It is so because it has to fight against the deepest and strongest principle of all Life—selfishness.

When we ask ourselves how we *would* that others should act towards ourselves, our standard of duty is apt—through the influence of selfishness—to be unreasonably high. When we ask ourselves how *we* ought to act towards others, our standard—through the influence of selfishness—is apt to be unreasonably low. Self-interest in both cases blinds us. Instead of inquiring how we " would " (that is, would *like*) our neighbour to act towards us, let us ask ourselves how we think our neighbour *ought* to act towards us.

We have spoken of benevolence as well as justice. We will confine ourselves, for the present, to justice alone, the reason for so doing being that benevolence is not a duty. We do not *owe* benevolence or love to any one. Love is a gift, not a debt. If we *owe* love—as in the case of marriage—then love is not only a gift, but is *also* a debt. It is given first, independent of return. It is afterwards exchanged for the love of its object, and then becomes a debt. The moral relations between husband and wife include perfect debt and perfect gift, perfect justice and perfect love.

Justice owes, and pays.

Injustice owes, but does not pay.

Justice takes only what belongs to it, what is owed to it.

Injustice takes what does not belong to it, and robs: robs, by taking what is not its due; robs, by with-

holding payment of what it owes. Every kind of injustice is to be resolved into some form of robbery.

What does our neighbour owe to us? To bring the question from the general to the particular, I will ask,—How *ought* my neighbour to act towards *me*?

If he owes me money or goods, he ought to pay me the money or the goods, and the goods ought to be of such quality and quantity as are due to me. If they are deficient in either, he is unjust—he robs me. If he is in such a position as to be able, with impunity, to evade complete payment either in quality or quantity, he robs me—he is unjust.

If I send a boy to school to be taught certain things which the keeper of the school, for a certain sum, undertakes to teach him, but does so imperfectly or not at all, he robs me—he is unjust.

If I hire a man to do a day's work, for which I agree to pay him five shillings, and he does only three shillings' worth of work, he robs me—he is unjust.

If, under the surface of some land which I possess, there exist certain valuable minerals the presence of which is unknown to myself, but known to some one who purchases the land at the value of the land alone, but not at the value of the land and the minerals, he takes advantage of my ignorance—he robs me—he is unjust.

If, on the other hand, I happen to know that the buyer thinks there are valuable minerals beneath the surface, and I *know* that there are none; and the purchaser thinks that there are, but that I don't know that there are, and I take advantage of his error to extort more than the land without minerals is worth, I rob him—I am unjust; he tried to rob me, and is unjust. The only difference between us is, I was successful in my attempt to rob him, while he was unsuccessful in his attempt to rob me. But we were alike unjust.

I go into a shop to buy something worth ten shillings. The seller sees that I am ignorant of the value of such

things, and charges me twelve shillings: he robs me—he is unjust.

I am a bachelor; I admire a certain girl, who is a selfish coquette. She observes my admiration. She thinks, however, that I am too poor to suit her, too old, not handsome enough, not of such position as she desires. Nevertheless she encourages me; it pleases her vanity and love of power to be admired, sought after, loved in preference to others. She acts as if she either returns my regard, or might easily be brought to do so. She leads me on with smiles, glances, downcast looks—that I may admire the beauty of her eyelashes,—flashes upon me, seemingly unintentionally, all the brightness of her eyes, lures me on to a declaration, and rejects me. To gratify her selfish vanity she robs me of my affections, inflicts upon me the "pangs of despised love," embitters, perhaps, my whole life,—she is unjust. My neighbour owes me truth—her whole behaviour has been a lie. My neighbour owes me truth, because if I act upon or am in any way influenced by his deceit—whether spoken or acted—I act upon non-existent promises, my conclusions are necessarily erroneous, and may cause me irreparable injury. Who shall trace the consequences of a lie in a prospectus, which leads a man to the investment and consequent loss of his money, perhaps to death by his own hand, the broken heart of his wife—it may be, in the case of daughters left unprovided for, unprotected, destitute, to a life of infamy and a miserable death.

There may often be a difficulty in perceiving whether a given act is just or unjust; but can any one deny that the way in which a man thinks his neighbours "ought" to act towards *himself* is the way in which *he* ought to act towards his neighbour? I will not ask that question of the imaginary individual with whom I have been talking, for I can make him answer as I please; but I will say that to myself the conception of justness carries with it in its very nature the further conception that I am under an obligation to *be*

just, that it is my duty to be just; and I think that such a conclusion is not peculiar to myself, but is accepted universally, its sanction is universal. Every man, without exception, thinks his neighbour *ought* to act justly to himself, and very often our selfishness will cause us to erect for him a very high standard of duty. In our *own* case it is too often different. We can see "the mote in our neighbour's eye, we cannot see the log of wood in our own."

In the conception of justice and the concomitant conception of duty to be just, we have a moral principle intuitionally perceived, universally accepted, and capable of immediate application to conduct by all men and at all times—not only by men and women, but even by children, by the educated and the uneducated, by rich and poor, high and low, civilised and uncivilised—and which in its operation shall be independent alike of hope of reward or fear of punishment; a principle independent of time and place, which nothing can abrogate, and whose stringency increases with increasing intellectual advancement, but which at the same time every one is free to obey or to disobey as he pleases. Till man conceived the idea of justice there was in the world but one principle of action—selfishness, or the gratification of desires regardless of injury or pain to others. There are now two: the second is the unalterable principle that I am bound under all circumstances to be just, not from hope of reward or fear of punishment—which would destroy the virtue of the act—but because, as every man owes justice to me, I owe justice to every man, irrespective of whether he pays me the justice he owes me. My intellect conceives justness and owns the obligation, the duty, to be just; my selfishness disowns such obligation, and continually urges me to disregard it. *I know* that there is only one way in which I can conquer that selfish solicitation,—*by thinking*, by opposing to the demands of selfishness my own self-conceived and self-imposed obligation to be just, to do right. *It is only by "thinking" that I can enable my desire to act justly to*

override, to conquer, my desire for selfish gratification involving wrong to others. It is in "thinking" that we are conscious of freedom, not in "willing;" for by creating thoughts we create motives, and motives give rise to willing, and willing gives rise to actions. Professor Tyndall asked, "Are we, or are we not, complete masters of the circumstances which create our wishes, motives, and tendencies to action?" and answers "Adequate reflection will, I think prove, that we are not." We certainly are not *complete* masters of the circumstances which create our wishes, motives, and tendencies to action; for we do not "create" (I thank Mr. Tyndall for using that word) our "sensations," but we do "create" our "thoughts," by means of which we can modify, can combat, can conquer, the desires arising out of such sensations when they conflict with justice, with duty, with right; can *compel* the lower principle of selfishness to give way before the higher principle of justice, of duty, of right. Sir William Hamilton said, "On the supposition that the sum of influences (motives, dispositions and tendencies) to volition A is equal to 12, and the sum of influences to volition B equal to 8, can we conceive that the determination of volition A should not be *necessary*? We can only conceive the volition B to be determined by supposing that the man '*creates*' [Sir William Hamilton's italics], calls from non-existence into existence, a certain supplement of influences. But this creation is inconceivable;"—whereas it is just what the man can and does do. If he "thinks" before he acts, the result of his thinking may be the creation of an additional 5 to volition 8, which, being then 13, overcomes the volition 12,—or it may be the other way. Neither Professsor Tyndall nor Sir William Hamilton seem to have recognised *the action of thought in creating motives*. Mr. Mill said, ". . . I ask my consciousness what I do feel, and I find, indeed, or am convinced, I could have chosen the other course if *I had preferred it* [Mr. Mill's italics], but not that I could have chosen one course while I preferred the other. . . . When we think of ourselves

hypothetically as having acted otherwise than we did, *we, always suppose a difference in the antecedents.* We picture ourselves as having known something that we did not know or not knowing something that we did know—which is a difference in the external motives ; or as desiring something, or disliking something, more or less than we did—which is a difference in the internal antecedents." He might have added—"or have thought some thoughts that we did not think." If these thoughts had caused us to "prefer" the *other* "course," then, as thoughts are *created* by the Ego, the said action would be *self-caused* by the Ego. When discussing "to murder or not to murder," he says : "The difference between a bad man and a good is not that the latter acts in opposition to his strongest desires ; it is that the desire to do right [created by thought] and his aversion to doing wrong [also created by thought] are strong enough to overcome, and, in the case of perfect virtue, *to silence any other desire or aversion* that may conflict with them." That is to say, the conception of justness or right, and the concomitant conception that he ought to do right and ought not to do wrong, which have been created by himself, are strong enough to overpower the natural principle of selfishness. He has originated the "motive" which causes him to "will" to act virtuously. *His virtue is true virtue because it is self-caused.*

Justice does not destroy the desire for happiness. It does not forbid us to seek for happiness. It says: Seek what happiness you please, but your search must be subject to one inexorable condition, which is—that happiness which can be gained only at the cost of injustice, of wrong to others is absolutely forbidden. If a happiness passionately desired lies within your reach ; if you have only to put forth your hand to take it ; if to forego it will entail a great and, it may be, even a lifelong pain ; if the wrong, the injustice, without committing which you cannot possess the happiness, may seem trifling in comparison with the gain,—*conscience—in other words, a man's standard of justice*—forbids the act

and says, "You must withhold your hand, you must not do the wrong, you must bear the pain." If I obey, some one may say, "Well, are you not equally bound by necessity whether you do the wrong or the right? What can be said about the act other than that you could not help doing as you did, could not help willing in obedience to the strongest motive, the strongest desire—which was to do right? Your action was compulsory, determined, necessary, not free; and I may be allowed to remark, that since, as you assert, that virtue to *be* virtue must be self-originated, must be free, virtue, in your sense of the word, must still be pronounced to be impossible."

To which I reply, that the compulsion was certainly present, and consisted in the conception of justice and my obligation to act justly. *But such conceptions were created by myself.* When these creations of myself "compel" me, I am *myself* the author of what compels me, and therefore am the creational cause of my own action, and am therefore free, because I am the author of my own motives. It is not my *will* that is free, but *myself*: for I have no "will,"—my will is only another name for myself. My willing is determined by motives which I have myself created. By thinking I can create good motives; by thinking I can create bad motives. I am a being capable of true virtue and of true vice. God cannot create a good being, He cannot create a bad being; but in man He can, and has, created a being who can make *himself* either good or bad. It is not "*a power not ourselves* that makes for righteousness," but a power in ourselves: the power to conceive justness and duty and love, the self-kindled Light that lighteth every man that comes into the world. There exists no man in such entire moral darkness as to think that there is *nothing* he may not do—who does not think that there are some things, however few they may be, that he *ought* to do—in whom there does not exist some idea of some kind of duty. That there is such a saying as "There is honour even among thieves," is

evidence that even amongst the lowest, the most depraved, the action of that power *in* us which makes for righteousness is not wholly absent. The light of justice—and even love—gives out a faint glimmer which at least serves to make the surrounding darkness *visible*, and which shall hereafter shine forth more and more unto the perfect day; and every living soul shall live in, and shall give forth, the human-Divine Light of more and more perfect Justness, of everlastingly increasing Love.

CHAPTER LII.

THE FIRST LIFE WAS NECESSARILY VEGETABLE.—ITS POWERS. —CONTRAST BETWEEN IT AND PHYSICAL NATURE.

MAN being capable of the creation, the self-origination of motives is a free being. By the creation of the conception justness he is capable of originating true virtue and true vice. He is a free being, capable of the self-acquirement of knowledge and the self-evolution of justice and love. He is capable of fulfilling the desire of God that he should make himself good.

But all his actions are not free actions: only those of them—whether good or bad actions—which are caused by motives which he has himself created, are free actions. In the case of a creature which is not so far developed as to be able to think, all its actions are "necessary," are "determined" by its bodily organisation and its psychological character and constitution, in the formation of which it had no share.

By the first conception of justness the non-human creature who created that thought became man. None of his actions up to that moment would have been either virtuous or vicious; but he would now be *capable* of both.

It may be here noted, that *all* a man's actions which are consequent upon motives self-originated by thinking are "free" actions, whether a moral or immoral element be present or not. It is necessary that this should be recognised, and also that we are concerned only with the freedom or necessity of actions, in which there is present some moral or

immoral element—the element of justness or unjustness, of right or wrong.

As *self*-evolution is the object of existence, *the primal, the first soul, would be created in the very lowest psychological state consistent with the possibility of self-evolution.*

What was the psychological state of that first soul? It must clearly have been what we call a vegetable cell; for if it had been an animal it could not have lived on the mineral and gaseous substances which alone existed. It was capable of being conscious, for without consciousness it could neither have desired nor have selected food. It was duo-sexual and capable of reproducing its like. It was more or less conscious of disagreeable degrees of heat or cold. It was capable of motion. It was capable of protruding or withdrawing parts of its protoplasmic body in seeking food, of assimilating or converting food substances into protoplasm, and of rejecting substances not so assimilable; and every creature was wholly selfish.

When that first life, that first soul, was created, the sum of things consisted of two factors. On the one hand there was the physical universe, with all its powers, its gravity, its chemical attractions and repulsions, its cohesities, its elasticities, its polarities, its heat, its electricity, its magnetism; its individual atoms, its overwhelming masses of atoms, its immeasurable forces. On the other hand, there was the newly created power, Life, Soul, in its microscopic environment of protoplasm. How tremendous is the contrast! The differences between them appear to be so immeasurable that no comparison seems possible. In one sense, indeed, no comparison *is* possible; because the *superiority* of that single life, with its powers and its possibilities of development, to the whole mass of physical substances and their powers is immeasurable. The physical universe exists only for the sake of that life. Except in relation to that life it has no value, for it is unconscious, is incapable of being conscious: to *it*, existence and

non-existence are the same. Whereas that life was capable of being conscious, capable of so developing itself,—I say capable, not of *being* developed, but of so developing *itself*, —as to acquire by its own labour such a knowledge of the nature of the individual atoms composing the various bodies which together constitute the physical universe, such a knowledge of their various powers and of their modes of action and reaction upon one another and upon itself, as to be able—within limits, limits which are continuously extending—to use them in such ways as seem desirable. It has been said we conquer physical nature by obeying it; rather, we conquer nature by resisting it, by pitting some of its forces against some others in such ways and in such proportions as shall effect for us a given purpose. The history of that first created life, and that of all its children, up to the present moment, is the history of an incessant battle with the forces of physical nature. The continuous struggle with physical nature is the fundamental condition of psychological and concomitant physiological development; as our struggle with selfishness is the fundamental condition of moral development. Conquest of nature is the result of the unassisted self-action of such powers as life possessed at the beginning. Conquest of selfishness is the result of the unassisted action of such powers as life possessed at the beginning.

Every life is a child of that first Life. Between each individual life and every other life there is a complete solidarity. In the lowest vegetable and in the highest mammal there is but one nature, which is common to all. All are *capable* of the same development, but all have not attained the same development.

How do self-caused psychological development, and concomitant physiological development, arise?

CHAPTER LIII.

EVOLUTION SELF-CAUSED BY PSYCHOLOGICAL ACTION.—THE STRUGGLE FOR EXISTENCE SELF-CAUSED BY UNLIMITED SEX-ACTION.

THE primal desires of a soul are food, sex, fitting temperature, and avoidance of danger or anything which causes pain.

The primal amœba, which must necessarily have been a vegetable cell, must have been placed amidst suitable conditions in relation to the procuring of food. Increase of numbers must have been extremely rapid ; *but so long as there was sufficiency of food for all who were born, there would, of course, be no struggle for existence.* When the number of lives became greater than could be sustained by the quantity of food-materials *available*, then would arise a *struggle* for such materials. The strongest would survive, would transmit their superiority to their descendants, and hence there would be evolution. But in what sense could such evolution be called "self"-evolution ?

Because it originated not from external physical causes, but from the exercise of a power possessed by life—*the sex power.* The struggle for life arose out of increase in the numbers to be fed, and such increase was *due to the unlimited exercise of the sex-power possessed by life. The struggle for existence is self-caused by life itself*, and such struggle gives rise to psychological action, and consequently to psychological evolution, and also to concomitant physiological evolution.

One of the effects of the struggle for food would be that it would give rise, under certain circumstances, *to some cells* beginning to feed upon other cells. I suppose the gradual change in certain cells from feeding upon mineral and gaseous substances to feeding upon the organised substances formed by vegetable cells, *led to emancipation from the bondage of the imprisoning wall of cellulose, and caused the change from vegetable to animal.* The presence of that "wall" in the vegetable cell entails upon it almost entire service to the animal cell. The function of the vegetable is to *serve* the animal. It is sacrificed to the animal.

Food being the first necessity of life, and the quantity of food-materials being insufficient to satisfy the hunger of the totality of lives desiring them, there is a struggle for existence, which gives rise to increased psychological or conscious action—gives rise to the imagination and application of new means to satisfy desires, and, as experience widens, to new desires, and consequently to more and more strenuous efforting to satisfy such desires. In the case of the unicellular protozoon we saw how increased psychological action, caused by the need to struggle for the means of life, led to increased command over the environing protoplasm, evidenced in the gradual purposive "differentiation" or "specialisation" of certain portions of it to particular functions, and we understand how "division of labour" *originated.* In the corticate protozoa the development of the unicellular animal reached its highest point—the "division" of the protoplasmic substance of the organism into two portions: the outer or "corticate," devoted to feeling and motion and the securing of food; and the inner or "medullary," devoted to nutrition and assimilation. The *beneficial* effects arising from unlimited sex-action, which results in the birth of greater numbers of organisms than there is food for, have been, first, psychological, and through psychological action, physiological. *The struggle for existence gives rise to the utmost mental and physiological action of which an organism*

is at the time capable. The successful have been better fed, and have given rise to a superior progeny—superior not only mentally, but physiologically; having more numerous and various desires, and consequently capable of more numerous and various satisfactions. But, ethically considered, the effects were *disastrous.* Selfishness has been intensified, and with it the power to gratify selfishness has increased. Every life sacrifices every other life to its own needs and desires. Every stronger kills and feeds upon every weaker. Increase of psychological and physiological development makes each more formidable to others, more destructive and cruel. Universal slaughter—inflicted or suffered—is the one law of existence ; and increase of mental and physiological development means increase of ability to inflict pain if victorious, of suffering pain if vanquished.

But with the rise of the multicellular organism through the union of two powerful opposite unisexual demicells there appears some little amelioration.

In the unicellular organism the child is at birth for ever separated from its parent. In the multicellular organism all the children of the patriarch-parent remain united with it, and together constitute a single organism in which the patriarch-Ego has subordinated its children to itself. They all serve the patriarch-Ego, but in return the patriarch-Ego serves all its children. *The relation of the child-egos to the patriarch-Ego, and of the patriarch-Ego to the child-egos, is one of mutual service.* But the relation of the organism to other organisms, and of other organisms to *it*, continues to be that of sacrifice. In every organism the principle of action is entirely selfish. The gratification of its own desires—without regard to the suffering or death of others—is the one object of every living creature.

Without unlimited sex-action and entire selfishness there could have been no struggle for existence. Without the struggle for existence there could have been no psychological

evolution. Without the conquest of selfishness through psychological evolution there could have been no true virtue.

The struggle for existence was caused by ungoverned sex-action. With governed sex-action the struggle for existence will terminate, and Man will be the master of his future.

CHAPTER LIV.

THE MORE NUMEROUS THE DESIRES, THE GREATER THE PSYCHOLOGICAL EFFORTING TO GRATIFY THEM,—HENCE EVOLUTION.

In the "unicellular" organism psychological evolution cannot be greater than can arise out of the experiences of a single cell.

In the "multicellular" aggregation of a patriarch-parent-cell and the whole of its children, we have—not a mere aggregation of psychologically unconnected individuals—but a Patriarchy, an organised community in which the action of each is specialised and co-ordinated with the action of some others in some particular way, and performs some special function having for its object the benefit of the individual in particular, the benefit of the patriarchy as a whole, or the special benefit of the patriarch-parent of the organism.

How does this remarkable state of things arise?

In the beginning, in the case of the earliest multicellular organisms—such as the hydra—we saw that the power of the patriarch-parent-Ego was, as yet, but little developed. United action of the parent and children was little "co-ordinated," was principally merely "simultaneous," or such as proceeds from a greater or smaller number of the cells desiring the same thing at the same time. In studying the phenomena of co-ordinated action,—assumed to be simply reflex and unconscious, but which we found, I think, valid

reasons for believing to be the result of the conscious action of the nerve-egos and ganglia-egos, we saw the effects of the increasing psychological power of the patriarch-Ego over its child-egos, manifested in the increasing physiological development of the body or total of the children of the patriarch-Ego as groups of trained instruments of continually increasing complexity; the functions of which were to minister to the gratification of the continually increasing desires of the patriarch-Ego, and of themselves arising out of continually increasing psychological development. In the hydra, the ascidian, the frog, the fish, the pigeon, the rabbit, the cat, the dog, the ape—as yet, incapable of morality—we saw how, through the action of psychological causes, the phenomena of evolution gradually became more complex, more numerous, more various, more wonderful.

But when in relation to a single multicellular organism we consider the phenomena of psychological evolution, we cannot help observing that it is *almost wholly confined to the "patriarch parent-Ego."* In these child-egos, which together constitute the nervous system, a certain amount of psychological development, a certain development of the "capability to be conscious" is perceptible on each nerve-ego; a capability which seems to increase in the *nerve-centres* of every ganglion, and continuing to increase up to the "nerve-centres" of the highest ganglia of the organism, which are nearest to the patriarch-parent-Ego—which I have given my reasons for believing to be situated in the *Lamina Terminalis*,—and *towards* which converge the great sensory nerves, and *from* which radiate the great motor nerves. The *other* child-cells of the patriarchy or organism do not seem to differ much from protozoic unicells.

Until some creature had attained to such a height of psychological development as to be able by thinking to create motives, everything must have been the result of the "necessary" actions and reactions of unconscious physical

causes on the one hand and of vital conscious psychological causes on the other.

But physics, however numerous may be the changes which they undergo, or the changes which they cause, cannot, being incapable of being conscious, have any "experiences," and consequently cannot develop themselves. Lives, or egos, or souls, or minds, or spirits,—names for lives in different stages of development,—being capable of being conscious, *have* "experiences," and can use or profit by them, and therefore can develop themselves.

What is an "experience"?

An experience is a name for a "state" of a life or ego of which that life or ego is, or has been, conscious. Such a state constitutes a "knowledge," which ends with the cessation of the state, but *if rememberable*, constitutes a permanent knowledge.

"Experiences" give rise to desires, and "desires" *give rise to psychological action*, which gives rise to efforting in such ways as shall tend to their gratification.

New experiences being the causes of new desires, and of psychological power being exercised to gratify them, it necessarily follows that *the more numerous and the more various are the experiences, the more numerous and the more varied and complex will be the desires and the actions to which they give rise.* Experiences are pleasant or painful. The intensity of action aroused will be in proportion to the intensity of the desire to procure the pleasant and to avoid the painful; the sensibility to pleasure and pain will gradually become greater and keener, and will give rise to proportionately energetic and complex action. The capability of being conscious will increase. The experiences will increase,—will give rise to increasing desires, and to increase of efforting to satisfy increasing desires; and we can understand how the psychological power is continuously called into increasing action, and how experiences and desires acting and reacting upon one another, and stimulating

the psychological and physiological powers of the ego to action, give rise to that continually increasing action which manifests itself as evolution.

But experiences, although numerous, are not necessarily *various*. If, from some cause or causes, the experiences of an Ego, though numerous, should be little varied, as in the lowest forms of Life—there will be little development, either psychological or physiological. Psychological development needs that experiences shall be not only increasingly numerous but also increasingly various.

In multicellular animals the most highly developed of the total of egos constituting the organism is, beyond comparison, the patriarch-Ego. How has it reached its wonderful pre-eminence, and what are the psychological and the physiological relations between the patriarch-Ego and its child-egos? And how and to what extent do they affect moral development?

In the unicellular organism the experiences are those of only a single cell.

In the multicellular organism, in consequence of that increase of power resulting from the union of two powerful opposite unisexual "demicells" in the form of the "compound duo-sexual "germ-cell" or patriarch-parent-cell, the parent-Ego is able to restrain its children from separating from itself at birth.

CHAPTER LV.

HOW THE PATRIARCH-EGO BECOMES SO IMMENSELY SUPERIOR TO ITS CHILD-EGOS.

In the case of nerve-cells—both sensory and volitional—the child-cell remains connected with the patriarch-cell by means of a prolongation of its own protoplasmic substance, and of that of the patriarch-cell, in the shape of a fine thread, called a *nerve*, by means of which—in the case of a "sensory" nerve-cell, psychological "states" or "experiences" *similar* to psychological states or experiences arising in the *child-Ego can be caused to arise in the patriarch-Ego. In this way the patriarch "experiences" the "experiences" of the child*, and as every sensory nerve-ego is, directly or indirectly, connected with the patriarch-Ego, the experiences of the patriarch-Ego include not only its *own* individual experiences arising out of sensations, memories, imaginations, thoughts, actions, *but also the experiences of its sensory children.*

It must be distinctly understood that the patriarch-Ego does not experience the experiences of the sensory child-Ego as if they were the *same* experiences; for an experience is, that a particular ego is conscious of being in a certain state; and no ego can possibly experience or be in the "state" of *another* ego; but it may experience a *like or similar state.*

When a sensory nerve-cell is acted upon by some cause, such action gives rise to some change in the molecular state of its protoplasm. This change in its protoplasm affects

the Ego of the cell, and gives rise in it to some further change in its molecular state, which change is propagated along the nerve to the protoplasm of the patriarch-Ego, and causes a change in the molecular state of the patriarch-cell; and the "conscious state" or "experience" or "feeling" of the patriarch-Ego will be more or less *like* that of the child-Ego in proportion to the *likeness* of *its* produced molecular state to the molecular state of the *child-Ego* from whom the molecular change of state has been propagated. But whatever may be the degree of likeness or of difference between the "experience" of the child-Ego and the "experience" of the patriarch-Ego, one thing is certain, that the experience of the child-Ego has given rise to *an* experience in the patriarch-Ego which is more or less "like" that of the child-Ego, and is, even if *not like* it, an addition to the *sum* of its experiences.

When a child nerve-cell gives birth to a child, the child remains connected with *its* parent by a fine prolongation of its protoplasm in the same way as its parent-Ego is connected with the patriarch-Ego; and this holds good in the case of every child of every nerve-cell; so that every nerve-ego is in direct or indirect communication with the patriarch-Ego of the organism, and often with a great number of others.

I have already given my reasons for believing that in the first segmentation or division of the compound germ-cell the "vegetative" cells of the patriarchy arise from the *first child* of the patriarch-cell, while a certain number of the nerve-cells arise directly from the patriarch-cell itself. Only the *first* of the series of vegetative cells arises *directly or immediately* from the patriarch-cell, while every child to which the patriarch-cell gives birth *after its first or vegetative child*, is of course the *direct child of the patriarch-Ego, and benefits by the experiences of the patriarch up to the time of its birth.* But none of the *vegetative* children—except the first—comes *direct* from the patriarch-Ego itself,

but only direct from the *first child* of the patriarch-Ego, and consequently cannot benefit from increased experiences of the patriarch-Ego. As a direct or immediate child of the patriarch-Ego can benefit by increase of experiences of the patriarch-Ego, I venture to think it probable *that such direct children form the parent-cells or egos of ganglia. In the parent-Ego of a ganglion or co-ordinated group of nerve-egos*, the capability of being conscious is developed in a high degree, a degree *which increases as we rise to centres nearer and nearer to the patriarch-Ego*, in which the capability of being conscious is equal to the sum of the capability of being conscious of all its child-egos.

Each ego inhabits a certain mass of organised protoplasm, loosely called a cell, which constitutes its inner environment, and by means of which it acts upon its outer environment, and by means of which its outer environment acts upon it. Protoplasm is of course non-living. It is the inhabiting Ego that feels, chooses, remembers, thinks, imagines, reasons; that is able to purposively oppose atomic powers to other atomic powers, so as to produce new arrangements of them which shall tend to gratify its desires. When God made that new arrangement of atoms which constituted the first protoplasm, in the midst of which He placed the newly created first life, God, in effect, said: "I bestow upon thee the power of self-evolution, the creative power of thought. By thine own labour evolve thyself psychologically, physiologically, morally. *By thine own unaided, unassisted, unguided efforts acquire knowledge; make thyself Just, Holy, Good. Out of the spirit of unbounded selfishness evolve the spirit of universal love.* What thou becomest must be thine own work. Great and long-enduring will be thy sufferings; and ere thou reach the ends for which I create thee, many and bitter will be the tears thou wilt shed: great will be thy wickedness and thy shame. I deter thee from evil by no threats of punishment; I bribe thee to goodness by no promises of reward. *I give thee no help; for to help*

thee would be to defeat the object for which I create thee. I leave thee to thyself. I *desire* that thou shouldst become good; but thy goodness must be thine own work, originated by thine own self, created by thine own self. Thou must be good, not for the sake of pleasure, of happiness, of reward, *but good for the sake of being good*,—good, because the greatest good in the universe, and to which all other things must give place, is to *be* good."

CHAPTER LVI.

THE PSYCHOLOGICAL AND PHYSIOLOGICAL RELATIONS OF THE PATIARCH-EGO TO ITS CHILD-EGOS.

By processes of self-evolution, consequent upon the psychological action of the First Life and its descendants, and extending over æons of time, we are able by thought and reason to understand something of the nature of Life, and of the modes and processes of that intellectual and physiological evolution which has resulted in man. We have seen how admirably fitting have been the inner environment of protoplasm and the outer environment of things to afford conditions and occasions for such intellectual and physiological self-development. We have now to consider how far such self-developments afford fit conditions and occasions for man's moral development.

A man, we have learned, is an organism consisting of a patriarch-parent-Ego and its descendants. The children of the parent-Ego are subordinated to the use of the parent-Ego, while the parent-Ego is to a large extent the servant of its children. There is mutual service.

With the exception of nerve-cells, a given cell cannot profit by the experiences of other cells. It can have experience only of its own individual states and wants. A nerve-cell can have experience of states and wants other than its own. Every nerve-ego has at least three sources of experiences: those which arise directly in itself, those which arise out of its connection with a muscle or other cell, and those which arise out of its connection with the parent-

Ego cell of a ganglion or nerve centre, or with the patriarch-Ego itself. In a nerve centre or ganglion, the parent-Ego of the ganglion may have very numerous and also varied experiences through its connections with other ganglia. By means of the nerves and the nerve centres or ganglia the patriarch-Ego is made to know the states and wants of the various units composing the organism, *and thus gathers up into itself the sum of the experiences of the whole patriarchy.*

Such are the relations—psychological and physiological—of the patriarch-Ego and its child-egos. What are their moral relations?

I have shown that the foundation of morals is intellectual; that not until life has attained to such a height of psychological development as to have evolved its creative power of thinking,—has evolved itself so far as to be able to conceive the thought Justness, Unjustness, was morality possible. Man does not "discover," does not "invent" justness, but *creates* it. If we contrast the psychological power of the primeval vegetative life with that of man, able to think, to create morality, and clearly understand that man is the result of the self-evolution of the power Life, we do not wonder that the time needed for such evolution has been so long, the processes so painful and so slow. Between the dim conceptions of oppositions in the earliest stages of the evolution of the creative power to think—latent in every life—and the high development of that power which made the conception of justness possible, and which, as it seems to me, signalised the passage from the brute animal to the human animal, there must have been a very long interval.

Recognising the identity of all life, we do not restrict intelligence, thought, reason, to the human creature alone. When I said that non-human creatures were incapable of goodness or of badness because they were incapable of thought, I did not mean that they were incapable of *any*

thought, but that they were incapable of that *reach* of thought, incapable of that conception, which expresses itself as justness—unjustness, ought—ought not; the proof of such incapability being that non-human creatures are not moral.

The wonderful actions performed by apes, elephants, dogs, cats, foxes, cannot be accounted for in any other way than by attributing to them some ability to think and to reason; and when we consider the ways and actions of ants, bees, wasps, spiders, and of animals even lower in the scale of being, it is equally impossible to deny to them also a certain power to think and to reason. And occasionally there seems to be present in some of the actions of animals a certain element of morality. But I think consideration of such actions leads to the conclusion that there is present in them no element of justness, of rightness. All actions seem to have for their object selfish advantage. They may be clearly *useful*, but beyond that they do not seem to go. If we were to attribute to them any philosophy of conduct, it would be that of a kind of utilitarianism, in which benefit to the individual and to the community was their criterion of "goodness." That which we term unjustness, cruelty, treachery, murder, when useful, when beneficial to the individual or the community, would be considered as "good." As the condition of evolution, the struggle for existence and the survival of the fittest—while it tended to psychical development, tended also to the intensification of selfishness—it is no wonder that the first developments of the creative power to think should not have been in the direction of justness, but of cruelty. Increase of intellectual development meant increase of ability to gratify increasing desires, and such gratification meant increased unjustness, increased cruelty, increased treachery, increased murder; and we can understand that the period which elapsed between the first evolutions of the power to think, and such a development of that power as rendered the conception of justness possible

was a very long one; and, as it seems to me, *it was that conception which changed the non-human animal into the man.* Up to that point all creatures were at the same time wicked and not wicked: wicked, as being restrained from no action because its commission involved injustice and cruelty; not wicked, because they had not knowledge of what constituted wickedness.

From that illustrious non-human creature who first created the conception Justness—Unjustness, Ought—Ought not; the FIRST MAN, the father of humanity, the originator of morals; who, out of the total wickedness which was not wicked, created, evolved the first seed of virtue, who inaugurated the great battle between goodness and selfishness, and to whose memory we might well erect a monument to which St. Peter's and St. Paul's should be no more than hovels, we pass to the human being of our own time, to the men of to-day, to ourselves.

I postulate that God "desires" that the number of good beings should increase; that though God can create an innocent, He cannot create a good being, because the nature of true goodness is such that it cannot be given, cannot be communicated; but must be self-originated, self-created. He has, therefore, in the form of life or soul, created an existence which in the beginning possessed, in a latent form, the creative power which we call thinking; which, by a long and painful process of evolution, attained such a height of development as to render the *self-creation of motives* possible; and so, through such "creation," the self-origination of true goodness and of true badness, I postulate that man exists for the self-acquirement of knowledge and the self-evolution of justice and benevolence or love,—not the mere reception of knowledge *communicated* to him, but acquired by his own labour; not virtue consequent upon power infused into him by God—which would be God's virtue, not man's—but by his own labour, at the cost of his own suffering, by the exercise of the creative power

of thought with which God has endowed him. I postulate that the nature and constitution of things, and of life, and of their relations to each other were so *created*, so *designed* by God, as to afford fitting conditions and occasions for such self-evolution.

CHAPTER LVII.

MAN'S MORAL RELATIONS TO HIS CHILD-EGOS.—THE WORLD THE FLESH, THE DEVIL.—THE CONSCIENCE.

THE question now before us is,—What are the *moral* relations between the patriarch-Ego and its child-egos, and to what extent do they give rise to fitting conditions for the evolution of true virtue and of true vice?

In relation to actions in which no moral or immoral element is prominently present, a man seems to himself to be a single entity, a single individual. In actions in which the ethical element is present, he seems to himself to consist of two entities, of two selves; and these two entities, these two selves, are frequently in a state of violent opposition to each other. When such occurs he seems somehow to be *each* of the two entities, and "himself" besides. Each of the two entities desires to have its desires gratified; and each, as it were, importunes the—what shall I say?—the entity which I call "myself," to side with it, and so to act as to satisfy its desires, rather than those of the opposing entity. The other entity pleads as earnestly to have *its* desires gratified; and the contest is sometimes very severe. The "myself" thus seems to fulfil the function of a judge between the two. But the function of the "myself" is not simply that of a judge, for it also performs the function of an advocate; and not only of advocate for one of the contending entities, but for *both*; and not for each alternately, but for both at the same time. For whilst, as advocate, it is pleading in favour of one entity, it is also, as advocate on

the part of the other, listening to the arguments advanced, and noting objections, flaws, weaknesses ; and yet, while so acting on behalf of the two entities, it still sits upon the bench, and considers the arguments which, as advocate for each entity, it advances, and also attacks, and finally delivers judgment,—a judgment which varies from the basest injustice to the loftiest justice, from unmitigated wrongness to a rightness which is ideal.

Is it possible to understand and to reconcile these seemingly inexplicable contradictions and absurdities?

A human creature is supposed to consist of a "soul" and its "body." It really, as we have seen, consists of an immense number of souls or egos, each of which inhabits its own particular cell or "body," which consists of protoplasm. What is called the "soul" is the patriarch-Ego. What is called the "body" consists of the child-egos and that patriarch-Ego. The patriarch-Ego is *the* "Ego," *the* "soul" of the organism or patriarchy. Each child-ego, like the patriarch-Ego, has a "will of its own," has desires, aversions of its own, "experiences" of its own. The nerve-egos have more numerous experiences than other child-egos. The nerve-*centre* egos, or parent-egos of ganglia, have, concentrated in them, the experiences of all the nerve-egos connected with them. *The* Ego, the parent of all, has concentrated in itself the experiences of its child-egos, and also its own particular experiences.

The highest result of psychological development is the conception of justness—unjustness, ought—ought not. Only the human creature is capable of that conception ; and in the human creature only one of the egos—the patriarch-Ego, the Ego, the I, the Me, the Myself, is capable of that conception. The child-egos are not capable, except, perhaps the parent-ego of the very highest ganglia. Consequently all the others act only for selfish ends, irrespective of injustice or injury to others.

Every child-ego is capable of being conscious, of

experiencing desires, and of further desiring to have its desires gratified, and is also capable of acquiring new desires. The child-egos (and also the nerve-egos themselves), by means of nerve-fibres make known to the patriarch-Ego their states, their wants, their desires, and give rise in the patriarch-Ego to states *like* their own, so that, in effect, the patriarch-Ego desires what the child-egos desire.

Now the child-ego experiences only its own desires, but the patriarch-Ego experiences—at one and the same time—the desires of its various *child-egos, and its own individual desires also*, and the satisfaction of some of these desires may conflict with the satisfaction of some other desires: nay, it may be that the satisfaction of both desires is impossible, and that if one be satisfied the other must be sacrificed, and there is a struggle. Now, as the child-egos are, from their low intellectual development, incapable of morality—that is, of justness, rightness—and are wholly selfish, while the patriarch-Ego may have attained to a high moral development, it will happen that some of the child-egos may desire something which the patriarch-Ego's conception of justness, rightness, duty, *forbids it to grant*; and then is a struggle,—more or less violent, as the case may be.

The immoral and non-moral factors in such struggles have been named "the *world*, the *flesh*, and the *devil*." The moral factor has been named the "*conscience*."

The "World" expresses desires and temptations which have their sources without the body.

The "Flesh" expresses desires or temptations which arise within a man's own body, and are expressions of the desires of the non-moral child-egos for food, drink, sex,—right in themselves, but in excess, gluttony, drunkenness, unchastity.

The "Devil" expresses a man's own evil thoughts in relation to desires which cannot be gratified without injustice, greater or less, to others—thoughts which, when

their tendency is to *issue in gratification* of desires, irrespective of injustice to others, we call Evil.

"Conscience" means a man's own good thoughts in relation to desires which cannot be gratified without injustice, greater or less, to others; thoughts, the tendency of which being to issue in *abstinence* from gratification of desires because their gratification involves injustice to others, we call Good.

Those thoughts which we call inducements or promptings to evil, men have supposed to be suggested—nay, actually spoken to them—by an imaginary being supposed to be the author of evil, the enemy of God, the tempter and enemy of man, the Devil.

Those thoughts which we call inducements or promptings to good, men have supposed to be suggested—nay, actually spoken to them—by God; or by "conscience," which was supposed to be the "voice" of God speaking directly to man, exhorting and commanding him to be good; and, on some beliefs, alluring him to do right by promises of eternal happiness, deterring him from evil by threats of everlasting punishment.

Not knowing that a man "creates" his own thoughts, and being therefore unable to account for their existence, it is not to be wondered at that men should have attributed them to some external personal cause. They thus imagined causes and conditions of action such as would render true virtue impossible; for if a man's good or bad actions were consequent upon causes external to himself, then such good or bad actions would not be due to the man himself, but to the being or beings which acted upon him.

Now, as the child-egos are—from their low intellectual development—incapable of morality, of justness, rightness, and are wholly selfish, while the patriarch-Ego may have attained to a high moral development, it will happen that some of the child-egos may desire something—an excessive quantity of wine, for instance—which the patriarch-Ego's conception of duty to himself, and duty to his child-egos—

for whose welfare he feels himself to be in justice responsible—forbids him to grant, and there is a struggle for mastery, more or less violent as the case may be. The elements right and wrong being involved, it is a "moral" struggle.

It is to be distinctly borne in mind that, as the patriarch-Ego experiences *like* states with those of its child-egos, it necessarily follows that when the child-egos desire some satisfaction which can be attained only at the cost of wrong, the patriarch-Ego desires it also. But in the case supposed the patriarch-Ego also desires to do right. It thus *at the same time desires to do right and to do wrong.* It experiences its own state and the states of its child-egos at one and the same time. It pleads to *itself*—which sits in judgment, *while* it pleads—in favour of the *wrong* satisfaction desired by its child-egos, and also desired by itself. It pleads to itself in favour of the *right* desired by itself and against the wrong desired by itself and by its child-egos.

The child-egos are the "flesh;" the thoughts created by the patriarch-Ego and urged in *favour* of the "*guiltily*" wicked desires of itself and of the "*innocently*" wicked desires of its child-egos, are the "devil;" the thoughts created by the patriarch-Ego and urged by it in *opposition* to the wrong gratification desired by itself and by its child-egos, are the "conscience;" and to the question whether "it is possible to reconcile the seemingly inexplicable contradictions and absurdities" which presented themselves "in our study of the factors and the phenomena of a "moral struggle," the answer must, I think, be in the affirmative. For if it be true that God, though desiring that good beings should exist, is unable to create good beings because the nature of true virtue is such that it is possible only by self-origination, but *is* able to create beings possessing, at first in an undeveloped state, the creative power of thought, by the use of which they can originate true virtue, can *make themselves* good, and has created and endowed them

with such powers, and placed them amidst such conditions as shall render such evolution possible; if it be true that "man exists for the self-acquirement of knowledge and the self-evolution of justness and lovingness;" if I have rightly observed the phenomena of physical and vital and moral history, and have rightly interpreted them, the "seemingly inexplicable contradictions and absurdities" which presented themselves in our study of the factors and the phenomena of a "moral struggle" have no existence, and no "reconciliation" is needed.

I have, I think, clearly shown that all evolution is the result of psychological action, and that all the phenomena both of physical and vital existence have been, and are, eminently fitted to afford conditions for such evolution, which finally reached a point at which moral development became possible. When that point was reached (the point when a non-human creature, by reason of its psychological development, was capable of creating the conception of justness—unjustness, ought—ought not), development became principally —indeed, almost wholly—in the direction of the acquirement of knowledge and the evolution of virtue.

The *non-human* creature, *which, by its creation of the conception justness—unjustness, transformed itself from a brute to a man*, was, up to that moment, entirely selfish, entirely though innocently wicked. It was in reality neither good nor bad, any more than a magnet, when it attracts a needle, is good or bad. Through that creative act, by which it *self-caused* itself to become man, it became capable of good, and also capable of evil. Up to the time immediately precedent to that wonderful change, the patriarch-Ego and its child-egos were alike selfish and non-moral. No desire which *could* be satisfied—at whatever cost to others—was ungratified. The patriarch and its children desired the same things: there was harmony. *But when "conscience" was born*, when on the part of the patriarch-Ego satisfaction of desires became subject to the condition that their

gratification should not involve injustice, there arose a discord, and there commenced that struggle between the united *non*-morality of the child-egos and the *im*-morality of the patriarch-Ego, and the *morality* of the patriarch-Ego, —between the world, the flesh, and the devil, and conscience; the struggle between selfishness and justness, between selfishness and love.

"When conscience was born."

Morality arises out of the application of the conception of justice to actions. Such application involves judging, or a judgment. "Conscience" consists of the sum of such "applied" judgments, and in a given man determines what he thinks he ought, or ought not, to do. Conscience is a man's rule or standard of rightness and wrongness.

If I suppose myself to have a desire which cannot be gratified without infringing the rule of rightness prescribed *by* myself *to* myself, and my "conscience," which is "myself," considering, deliberating, judging, deciding, choosing, and then pleading for the right, is said to tell me that because my desire is a wrong desire it must not be gratified, it simply means that I am "conscious" (hence *consci*-ence) of deliberating, of creating thoughts, of drawing inferences, of reaching conclusions, conscious of *creating inducements to abstain from the wrong*, or *to do the right*, as the case may be. If my desire to have my wicked desire gratified is so strong that *I refuse to listen* to the judgments, the pleadings of my conscience (which is myself,) then, *my devil* (which is also "myself") performs a similar series of acts of thought—"*creates*" *inducements to commit the wrong*. On the one hand, *my Conscience* (which is myself) recognises that I ought to permit to myself no gratification involving injustice, and—by thinking—creates inducements to *abstain* from the wrong—pleads for self-denial. On the other hand, *my devil* (which is also myself), thinking only of selfish gratification, creates, by thinking, inducements to self-gratification, regardless of injustice; or tries to show that

there will be no wrong done, or not enough wrong to render abstinence imperative. If the thoughts created by my conscience (which is myself), and presented *by* myself *to* myself as inducements, are stronger than those created by my devil (which is myself), and cause me to *abstain* from the wrong action, *they change from inducements to motives*—in other words, *they move me to "will"* not to do the wrong. If the thoughts created by my devil (which is also myself), and presented *by* myself *to* myself as inducements to *commit* the wrong, are stronger than those created by my conscience (which is myself), and cause me to commit the wrong, *they* change from inducements to motives—in other words, they "move" me to "will" *to do* the wrong. What we call "deliberating," or "considering" is the creating of thoughts in relation to conduct. Such thoughts are inducements or solicitations to some course of action rather than to some other. Unsuccessful inducements are those which fail to "move" to "willing," which do not become "motives." *Successful* inducements or solicitations we call "motives," because they do move us "to will."

When we distinctly recognise that a man "creates" his thoughts, and that thinking, deliberating, means the creation of "inducements," which, either in favour of right or in favour of wrong, become motives or self-originated causes of willing the performance of actions—which actions are thus *self*-"caused," self-originated—the true nature of moral freedom becomes clear. *Moral freedom does not consist in free willing*—which a very small amount of metaphysical study demonstrated to be impossible, indeed, inconceivable—*but in free or creational motivation.* Even when a man was obliged by the arguments of the metaphysician to own that he had not—could not have—free will, he nevertheless instinctively felt, or was conscious, that when, in a given case, he deliberated as to what he should do, how he should act, and when, after considering "both sides of the question," he, as he said, "chose" to act in one

way rather than in some other, he could not help believing that, somehow—though how, he could not understand—he had acted *freely*. And he was right; for the "thoughts" which led to his "preferring," and *consequently* "choosing" to act in one way rather than in another, were created by himself. He self-caused his "preference," he self-caused his choice, he self-caused his consequent action. He was, in relation to *that* action, "free."

The reason why a man acknowledges that he "ought" always and under all circumstances to do what he "believes" to be right, and is not free to refuse to do what is right, and that he possesses the power to do what is right, *is that such obligation is created by himself, is self-imposed, is the result of his own "creative" action, when he "created" the conception Justice and the concomitant obligation to be just.* When a man is assailed by a strong temptation to commit some action which he knows to be wrong, *he also knows that he possesses the power to successfully resist that temptation.* That power is the power to think—the power to create motives; and he knows that he can, and ought to, create *good* motives. He knows that the obligation to do right, the obligation not to do wrong, carries with it the further obligation to USE that creative power of thought by means of which he is able successfully to resist temptation to do wrong,—whether positive or negative, the doing of wrong, or the not-doing of right. If, under the pressure of the temptation, he *refuses to think, refuses to create motives* which shall enable him to obey his *self-created law* that he shall commit no wrong,—if he prefers the wrong *when he has the power to cause himself to prefer the right,—he is "freely" wicked instead of being "freely" virtuous.*

The intellectual conception of justice is the foundation of morals. When a particular conception is the basis of some course or description of conduct, we call it its principle of action. Justice is the principle of right action.

The application to actions of the principle of justice

constitutes the conscience; the application of the principle to a smaller or greater number of actions expresses the greater or less *development* of conscience. In a perfect man, conscience or Justice and Love would govern all his actions: he would do no wrong. When we think of the man of to-day, when we consider him in relation to that moral ideal—which grows out of our "idea" of how our neighbour *ought* to act towards *ourselves*—and which is more or less distinctly present in the minds of most of us, how terrible, how humiliating is the contrast! When we recognise the difference, not between ourselves and the ideal man,—but the difference between what we are and what we know we might be; when we think of our weakness in temptation, of our shameful defeats when we feebly "try to be good," of the imperfection of our conceptions of justice and the scantiness of their application, of the weakness of our sympathy and the coldness of our love, of the easiness with which our selfishness blinds us to the rights and just claims of others, of the indolence which leads to the non-performance of the good that we acknowledge we "ought" to do, of the energy—sometimes rising to mad fury—with which we seek the satisfaction of our own desires, of our envy of the superiorities of others, of our hatred of those who stand in the way of our pleasure or of our success, and even of the malice which can scarcely repress a secret base emotion of pleasure over their failures and misfortunes, of the keenness and bitterness of our rivalries and the unscrupulousness of our ambitions, of our indifference to sufferings that do not touch ourselves, of our greed of pleasure and our contemptible impatience of pain,—when we think of these things, how deep is our humiliation, how burning our shame!

And yet, in that humiliation, that shame, that sometimes unbearable contemplation of what we are in comparison with what we ought to be, lie our hopes for the future. I suppose that, with most of those who have travelled any considerable distance along the highroad of life, there has been

some extension in some directions of the application to conduct of the principle of justice—some growth of conscience; that there are at least a few things we once did, which we would not do now; that we are—if only infinitesimally—better than we were, and also some of us worse. Some there are who are so lost, so dead to "righteousness"—that all-comprehending name for "just" action—as to have no thought of better or worse, of advance or degeneration, who practically say to themselves: "Let us get out of life all the pleasure possible. Right and wrong are mere figments created by those who misread the phenomena of existence, mere ropes of straw which the wise man shakes off with a contemptuous shrug. Whatever we are or may become is the result of our constitution and character, in the making of which we have no share. 'Let us eat and drink, for to-morrow we die.' This useless struggling after a non-existent and certainly impossible virtue is simply "folly."

The intensity of that struggle and the pain of failure in our efforts to be good, our self-reproach, even our remorse, are evidences of our progress. It is not that we are less good than we were, but that our conception, our standard of virtue, has risen. It indicates that the authority of conscience has become more powerful, and governs, or at least influences, a greater number of our actions. The growth of morals is the growth of conscience. The number of things which *we must not do*, because they are wrong, increases. The number of things which *we must do*, because they are right, increases. The growth of conscience is contingent upon two conditions: intellectual development, which determines the extent to which a man is able to *perceive* in actions *the presence of injustice*; and some new conquest of selfishness. We are quick to perceive injustice which we suffer; we are slow to perceive injustice which we inflict. Selfish concentration on our own well-being renders us unobservant, or, if we do observe, careless of the injustice

suffered by others, and apt to look on their wrongs with indifference. In the non-human creature the whole mental and physical forces of its nature are concentrated upon one object—self-gratification. With the first conception of justness-unjustness, and its application to some action, selfishness receives its first check. The patriarch-Ego has successfully resisted the gratification of desire involving injustice. *In the patriarch-Ego* there are now two principles of action: the principle of selfishness, and the principle of justice. *In the child-egos* there is present no principle of justice; self-gratification remains, as before, the *sole motive* of action.

To the question "What are the moral relations between the patriarch-Ego and its child-egos?" my answer is, They are such as I have endeavoured to set forth as resulting in the struggles between the "flesh" and the "devil" and "conscience." The external "world" and the non-moral child-egos—which are as external to the patriarch-Ego as the world is—are, in their sum, what they are and as they are in order to furnish fitting conditions in the midst of which the patriarch-Ego may by its own self-action acquire knowledge and evolve justice and love. Is it possible to conceive conditions for the self-evolution of virtue more perfect than those set forth, and in the midst of which true virtue is evolved by a perfectly, though at first innocently wicked, being by the use of the creative power of thought which it possesses? It *creates* both virtue and vice, both good and evil. It is by its own work that the innocently wicked act becomes guiltily wicked. It is by the use of that true "sword of the spirit," the conscience—that godlike weapon which, with countless tears and immeasurable suffering, it is slowly perfecting—with which it fights, and is slowly conquering the fiery dragon of selfish desire. Often it breaks in the hand that uses it, because its metal, which ought to be of the pure steel of justice, is alloyed with the base metals of greeds, hatreds, lusts, envies, cruelties, treacheries,

all rights possessed by the giver, so cannot give rise to debt. No conceivable greatness of gift can give rise to debt.

Let us consider the relations between a human child and its parents. If we ask, What does it "owe" to its parents? the reply will be,—To its parents it owes its existence, its maintenance during the helpless years of infancy, its education during childhood and youth. It is indebted to them for all the self-sacrificing love which may have been needed to enable them to fit it for the struggle of life. What does it *owe* to its parents? It "owes" them everything.

To these statements let us apply the principle of Justice. A thing cannot cause its own existence. By causing the child to exist the parents justly become responsible to the child for having caused it to exist. To suppose that the child can, in any sense whatever, incur obligation through an act in which it had absolutely no share, is absurd. Instead of the child "owing" to the parents, it is the parents who "owe" to the child. When the child is born it is entirely helpless. It cannot sustain itself; it cannot fit itself for the struggle for existence. The parents having for their own pleasure and by their own act caused the child to exist, are in justice bound to care for it, to support it, to educate it, until the child can care for, can support itself.

If the parents fail to discharge these debts; if the child's life is a life of misery, if it grows up weak and sickly in body, feeble and undeveloped in mind—unable, when it reaches maturity, to effort successfully for the satisfaction of its desires, the parents have inflicted on it a frightful injustice. They have voluntarily incurred immense obligations which they have wickedly failed to discharge.

Does such a child owe to its parents any gratitude? Must we not rather expect that its feelings towards them will be feelings of deep resentment and injury?

On the other hand, we will suppose that the obligations incurred by the parents have been faithfully discharged; that the child has had its body well cared for, its mind well

developed, and at maturity is admirably fitted for the struggle of life.

Will the child "owe" to its parents any gratitude? Certainly not: discharge of obligations calls for no gratitude. The parents have merely discharged their self-incurred obligations. They no longer owe anything to the child. The child—with one exception—owes them nothing. They have merely been just. Payment of debt by a debtor simply cancels obligation to the creditor. It creates no new obligation on either side.

But in setting forth what the child was asserted to "owe" to its parents it was said,—"It is indebted to them for all the *self-sacrificing love* which may have been needed to enable its parents to fit it for the struggle of life." Now, just in the same way, and for the same reasons, as the child is not bound to be grateful to the parents for payment to it of what they owed, neither is the child bound to be grateful to them for any love—no matter how great—which they may have bestowed upon it. The parents were not bound to love the child, but only to be just to it. Love, being a gift, cannot give rise to debt; therefore the child "owes" nothing to its parents, neither gratitude nor love. But as the parents *gave* love to the child, not in payment of any debt, nor in discharge of any obligation (for they "owed" it no love), but out of love, out of desire to benefit it, desire,—ranging from the giving it a straw for which it holds out its hand, to the sacrifice even of their own lives,—so the child may *give* to the parents a love, a devotion, as strong and as deep as their own. The moral essence, the heart's core of Justice and of Love, are alike. Justice done for the sake of some hope of reward or some fear of punishment, is not true virtue. Love given for the sake of some hope of reward is not true Love. They are alike only forms of disguised selfishness.

I said, "The child—with one exception—owes the parents nothing." That "exception," that "one thing," is—obedience.

"The parents having, for their own pleasure and by their own act, caused the child to exist, are in justice bound to care for it, to support it, to educate it, until the child can care for, can sustain itself." This they cannot do without the child's obedience. If a child refuses to obey the commands of its parents, refuses to allow them to discharge their duty to it, thwarts them in their efforts to fit it for the battle of life, then the parents are bound—in the interest of the child, and for its sake—to compel its obedience. The child cannot judge what is best for itself, and cannot in justice be allowed to frustrate the parents in their endeavours to fulfil their obligations. The child owes obedience to its parents because without obedience they cannot perform their duty.

When my "neighbour" bestows upon me some gift—a gift of help in difficulty, of direction in perplexity, of succour in danger, of food in want—does for me something which alleviates some pain or adds to some happiness, and if I have every reason to believe that his sole motive is my benefit, that he is not "good" to me for the sake of some prospective advantage to himself—such, for instance, as help to his own attainment of everlasting happiness—I attribute his gift or act to love. I experience a powerful emotion of gratitude; my heart goes out to my benefactor; there is born in me for him a responsive feeling of affection, of love. As my "neighbour" has given love to me, though he was not bound to do so, so I, though not bound to give back anything in return, *voluntarily* give him gratitude, give him love for his love. *Love gives rise to a God-like form of justice—the voluntary return of love for love.* Justice is obligatory justice; love is voluntary justice.

If we closely examine actions which are simply just, we perceive that the conquest of selfishness may be of only a negative character. Selfishness may be so far conquered that a man may be just, but at the same time he may not be at all benevolent. He may take all that he *can* take

without committing injustice, and he may also *keep* all that he *can* keep without committing injustice, and he is so far selfish, although he *is* just; for his own happiness—so far as it can be obtained without injustice—is his one object. He is bound to be just. He *is* just. He pays all he owes, he takes nothing that does not belong to him. But he has not learnt to "love," and because he loves to "give,"—to give of his goods, of his time, of his labour, for the benefit of others. He has not *voluntarily bound* himself to benefit others at the cost of a little of his own happiness, —of much of his own happiness,—in some extreme case even of all his own happiness. He has self-evolved justice; he has not self-evolved benevolence. He fulfils the self-imposed *necessary* obligations of justice; he has not, as yet, imposed upon himself the *voluntary* obligations of love.

We have seen how out of the intellectual conception justness—unjustness, arises the conception of debt, and the concomitant conception of duty or obligation to pay what we owe. How does the desire to give, to be benevolent, to act for the benefit of others, to be unselfish, to be generous, to be affectionate, to be loving, arise? and how does such love, having arisen, become obligatory as well as voluntary?

CHAPTER LIX.

BENEVOLENCE ARISES OUT OF SYMPATHY.—WHAT IS SYMPATHY, AND HOW DOES IT ARISE?

MAN desires happiness and dislikes pain. If he be in pain he desires its cessation, and endeavours to remove or at least to alleviate it. If his efforting is unsuccessful, he desires help. Should any one give him the needed help it will be out of sympathy. Benevolence arises out of sympathy. What is sympathy, and how does it arise?

A human creature is said to consist of a soul and its body, which together constitute an individual.

We have seen that a given man really consists of a patriarch-parent-Ego inhabiting a single cell, and that his body consists of an immense aggregate of egos, each inhabiting a single cell,—which are his children, and are subordinated to his use, but are in lower states of development than himself. Each cell-ego of these children is as distinctly separate from all the others, is as external to them, as a given man is external to all other men. The bond of union between the patriarch-Ego and its child-egos is sympathy. The cause and origin of sympathy is a fellow-feeling: that is, one cell-ego feels similarly to some other cell-ego or group of cell-egos. The more alike in nature and intensity is the feeling caused in one cell-ego by the action upon it of some other cell-ego, the more perfect is their sympathy. Sympathy depends upon the fact that a state of feeling in one ego may give rise to a similar state of feeling in some other ego. If my child-egos—which are

separate from myself—feel painfully hungry, I experience a similar feeling, because my child-egos by means of the nerves cause in myself a similar sensation, and there is "sympathy" between us.

If some other "self," some other man and his child-egos, feel painfully hungry, it is possible for myself *to sympathise with the suffering arising from that hunger, because I have myself suffered from the same cause. I remember* how *I* felt; I remember the pain. If I was unable to provide myself with food, I remember how keenly I desired that some one should give it me. The man may excite my sympathy by telling me of his state of hunger, and imploring assistance. Or from his sunken cheeks, his emaciated body, his hollow eyes, I may infer his state. The sight gives me pain. I may relieve myself from that pain by removing myself from the sight of that which causes it, or by giving to the sufferer the needed help; or if I am unsympathetic, hard-hearted, I may feel no pain at all. But if any of my child-egos feel pain, and by means of the nerve-communications between us cause me to feel with them, to sympathise with them, I cannot remove myself from *them*, and so cease to feel as *they* feel. I can remove the pain only by using appropriate means. If I do use such means, my motive is my own benefit—the removal of pain experienced by myself.

Sympathy for my child-egos is caused by their acting upon me through the nerves so as to cause me to feel as they feel.

Sympathy for other persons suffering pain—whether bodily or mental—is caused by the sight, or by the recital, or by the thought of their suffering, arousing in me, by physical and by mental association, the memory of suffering I have myself experienced. I re-experience something of the pains I have myself suffered in the past; the amount of my suffering being contingent upon my nervous susceptibility of pain, and the power of my imagination and thought, by the action of which I more or less vividly realise—by means

of my own past experiences of pain—the feelings of the sufferer.

Whenever any one feels pain it gives rise in him to a desire to remove or to alleviate it, or, if he is unable to do so, to a desire for help.

The sight of suffering may give rise to no sympathy, and consequently to no suffering in the spectator; or it may give rise to sympathy, and consequently to suffering. The effect of such suffering may be a desire in the spectator to get rid of his own suffering by removing himself from the sight of the cause of it; or to get rid of it by removing the suffering, the sight of which in another caused himself to suffer.

If the spectator removes himself from the sight of the sufferer to get rid of his own pain, his motive is selfish.

If he is unable to remove himself from the sight of the suffering, and—to relieve his own pain—relieves the pain of the sufferer, his motive is selfish.

If he stays, and removes the pain of the sufferer—not with the object of removing his own pain, but to remove the pain of the sufferer—he acts benevolently, lovingly.

If his object in removing the sufferer's pain be the pleasure such removal will give himself, he acts selfishly.

Malevolent actions arise out of the desire to procure pleasure by inflicting suffering on others, or are injustices accompanied by cruelty, and are the vilest form of selfishness.

Indifference—which is a negation—is the effect of absence of sympathy with the sufferings of others.

Benevolent actions arise out of a desire to relieve the sufferings of others or to add to their pleasures, and always have present in them the element of "cost" to the performer The greater the cost the greater the benevolence,—the greater the conquest of selfishness.

Benevolence implies giving, giving of goods or money or time or labour—physical or mental, or some of the giver's

happiness—greater or less as the case may be, or even all his or her happiness, or even life itself, for the benefit of others. Selfishness desires to get and to keep to itself all it can get and keep, and to give nothing. A benevolent act is a conquest of selfishness involving "cost" to the actor. The amount of cost to the giver determines the "worth" of the action: that which costs little is worth little; that which costs much is worth much.

Actions arise out of sensations, or memories, or imaginations, or thoughts, or out of combinations of these; all or some or any of which may give rise to sympathy.

In creatures in so low a state of development as to be incapable of thought, all their actions will be the result of sensations or of memories of *sensations only*, which sensations and memories of sensations and the desires and actions to which they give rise will be alike determined and necessary, for they do not themselves cause the sensations which cause their actions. They act from impulses which they do not generate. When such an animal, who is a mother, feeds her children, directs their motions, defends them from danger, performs actions which would seem to indicate the presence of benevolence, the appearance is illusory. Her actions are determined by her sensations, which arise out of her constitution; not to perform them would "cost" her more than to perform them. If certain of my child-egos are hungry, they, by the nerve connections between us, cause me to feel as they feel; and the effect is, that, with the help of some other of my child-egos, I provide food for their use. I do not do so out of any direct feeling of love for my child-egos, but because I should feel pain if I did not. My act arises out of my nature and constitution; *my* child-egos are not more parts of *myself* than the mother's immature young detached from her at birth are part of herself. Her "impulse" to care for her children is as much the result of her particular nature and constitution as my care for my child-egos is a part

of mine. In neither is any element of true benevolence present. Her motive is selfish, but as she is incapable of the conception of justice, she is innocently selfish. In the case of man, who has self-originated the conception justness-unjustness, that conception is more or less applied to his actions in relation to his body—to the sum of his child-egos He feels in justice bound to keep them well nourished bound not to injure them either by excessive or by insufficient use. Perhaps, when we come to realise that each child-ego is of essentially the same nature as ourselves, and is—*for a time—necessarily sacrificed in order that human evolution may be possible*, and that there will come a time, —after leaving this world—when all the "sacrifices" of other lives for our advantage will have to be repaid, we may come to think of them very differently from what we do now; we may learn to love them.

We have read of "A certain man" who went down "to Jericho, and fell among thieves, which stripped him of his raiment, and wounded him, and departed, leaving him half dead. And by chance there came down a certain Priest that way: and when he saw him, he passed by on the other side. And likewise a Levite, when he was at the place, came and looked on him, and passed by on the other side. But a certain Samaritan, as he journeyed, came where he was: and when he saw him, he had compassion on him . . . and bound up his wounds, pouring in oil and wine, and set him on his own beast, and brought him to an inn, and took care of him. And on the morrow when he departed, he took out two pence, and gave them to the host, and said unto him, Take care of him; and whatsoever thou spendest more, when I come again, I will repay thee."

Let us consider the influence of thoughts, which are created by the Ego—in "determining" the actions of the Priest, the Levite, and the Samaritan.

When the man going down to Jericho fell among the thieves, we are not told what was their number, or that

they robbed him of anything else than his "raiment." We will suppose that there were two thieves, and that his clothing was all the traveller possessed, and, that being enraged at the smallness of their booty, they savagely beat and stabbed him, and left him "half dead." The thieves certainly commenced their wicked act without thought of anything but their own selfish benefit—careless of its cruel injustice. But one of the thieves, when it came to the taking of the unfortunate man's last garment, might have "thought,"—"Well, if we do take his raiment, we may as well leave him his shirt;" and when the other, furious at gaining such a contemptible spoil, began to beat their victim, and finally to attack him with his knife, the other might remonstrate, with his fellow, against the useless cruelty, or even might compel him to desist before he had killed the man outright.

In the case of both the thieves, the obligation to be just was entirely overpowered by greed; but when spoliation reached the man's last garment, some small sympathy, some pitiful "thought" of the state of a man left by the roadside with only a single garment to protect him from the cold, was "self-generated" in the mind of one of the robbers, but was not sufficient to make him oppose such robbery. But when it came to beating and stabbing, the sight of the man's suffering, the "thought" of what must be the result of his evil treatment—possibly even his death—the "fellow-feeling," the "sympathy," and the "thoughts" originated out of that sympathy, were sufficiently powerful to cause active interference in the man's behalf, and were so far benevolent, and truly benevolent—for it had for its sole object the benefit of the unfortunate traveller. So strangely are good and evil mingled in human actions.

When the "Priest passed by on the other side," he saw the naked, wounded, blood-stained man lying on the opposite side of the road. "Ah!" he thinks, "another robbery and murder! How dreadfully unsafe the roads are! I had

best get on as fast as possible." As he turns from the sight, the wounded man gives a faint groan, which somewhat startles the Priest,—"Why, the poor creature is not dead! Whoever did the dreadful deed had better have killed him outright. However, it's no business of mine." And with hurried steps, and fearing for his own safety, he anxiously resumes his journey, hoping he will reach its termination without accident.

After a while, when the sun has set, and the first shades of evening begin to fall, the Levite, riding pleasantly on his mule, approaches the spot. As he moves along, he catches sight of the white, naked body of the half-dead man, lying amongst the dark bushes on the opposite side of the road, and moved by curiosity crosses over. "Dear, dear!" he mutters, "what a very sad case! Brutally murdered. What villainous, unfeeling wretches there are in the world!" As he somewhat sadly contemplates the unfortunate man, the eyes of the supposed dead man slowly unclose, and he looks up at the Levite with an expression of such pitiful entreaty for help that the Levite is touched by it; and he thinks: "Poor fellow! I should like to help him. But what can I do? Here is night just at hand; his own state is a proof of the danger of being abroad at night, and alone. Still, it is so sad a case that I should really like to help him. But I should have great difficulty in moving him. It is true, I might get him up beside me, but my beast is hardly equal to carrying double; and he seems quite helpless, and I don't see how I could keep him from falling, and certainly if I get off and put him in my place, he could not keep his seat. And then, even if I succeeded in getting him to the next inn, I should have to leave him there, and there would be great expense incurred. He might have to stay there for weeks—might even die there. And who is to pay? I certainly manage to get along pretty well, but I have nothing to spare for others. I must look to myself. I feel for him very much, but what can I do? And every moment

it gets darker, and who knows but that the vile wretches who have done this horrid deed may not be lurking somewhere on the road, on the watch for other victims?" As he glances fearfully around, he catches sight of the Samaritan in the distance. "Why, see there," exclaims the Levite, "yonder comes some one! May he not be one of the very gang who have robbed this man, and wounded him, it may be, to death? I must fly while there is yet time. Good-bye, you poor unfortunate: I feel for you very much. I am sorry I cannot stay to help you; but self-preservation is the first law of nature." And he puts spurs to his beast, and gallops off, and soon disappears in the gathering gloom.

Soon afterwards the Samaritan, riding at a rapid pace, reaches the spot, and seeing the white body of the naked man, reins up his horse abruptly, jumps off, kneels by his side and takes his hand. The wounded man has by this time recovered consciousness, and faintly grasps the hand extended to him, and with difficulty gasps out, "Help me—help me! Oh, do not leave me here to die! Help me: for God's sake help me!" And as he looks up to the stranger there is present in his eyes a very agony of entreaty. "Help you?" says the stranger, "of course I will; but how do you come to be in this miserable plight?" and he raises the man into a sitting posture and pillows his head on his own breast while the sufferer gasps out the story of his misfortune; and the water stands in the eyes of the Samaritan as he listens, and inquires where the man came from, and whither he was going. "I am on my way from Jerusalem to Jericho, and——" "Then you are a *Jew*," says the Samaritan; and his supporting arm is half withdrawn. The wounded man sinks a little, and utters a cry of pain: "Why do you shrink from me?" asks the man. "Because I am a Samaritan, and the Samaritans have no dealings with the Jews." "Then *you* will leave me, like the other. God, God, help me! for there is no help in man,"—and he falls back insensible.

"But," thinks the Samaritan, "though he is a Jew he

is still a man. If I were a Jew and in his place, and he were a Samaritan and in mine, I should feel as he feels; I should not, because I am a Samaritan and his enemy, feel other than as *he* feels. I should desire him to help me, as he desires me to help him. Shall I not do for him what I, if I were in his case, should desire him to do for me? If I leave him here in this state he will certainly die. Well, what is that to me? I am under no obligation to help him; and besides, we are enemies. And if I do help him and get him to the nearest inn he will have to stay there till he recovers, and who is to pay? The landlord will of course look to me." And he rises to his feet and half turns away; but as he turns, takes a last look at the unfortunate wretch. The pitiful sight is too much for him. His natural selfishness is conquered. He tenderly raises him, places some support for his head, "and bound up his wounds, pouring in oil and wine, and set him on his own beast, and brought him to an inn, and took care of him. And on the morrow when he departed, he took out two pence, and gave them to the host, and said unto him, 'Take care of him; and whatsoever thou spendest more, when I come again, I will repay thee.'" And that Good Samaritan, and He who conceived him, will never be forgotten.

The selfishness of the Priest was so great that he felt no sympathy, and was consequently indifferent even to such extreme misfortune and suffering in another. His "thoughts" had reference only to his own well-being and safety.

The Levite felt some small sympathy, but his "thoughts" were selfish, and easily overpowered the small feeling of pity.

The Samaritan at once and deeply sympathised with the traveller who had been so cruelly treated by the thieves, but on learning that the victim was a hateful Jew the Samaritan's heart at once hardened against him. His first "thoughts" were in favour of selfishess and hatred. But

he could not help perceiving the injustice of hating a man merely because he was of another nation, and who had never done him wrong; of withholding from him such help as he would, if he had been in the sufferer's place, have desired from him. His "thoughts" sway him from one side to the other, but are finally sufficiently powerful on the side of justice and benevolence to "originate motives" which cause him to "will" to help his suffering enemy instead of leaving him to perish.

We create our thoughts. Justice, and the obligation to act justly, arise out of thinking, and are consequently self-originated principles.

True benevolence also arises out of thinking, and is consequently self-originated; but, unlike Justice, carries with it no *necessary* obligation to be benevolent. Whether a man shall act benevolently or not is necessarily optional.

Every man recognises that every other man is bound to be just to him, to pay him what is owed to him, and that he is bound to pay to others what he owes to them. Any one denying justice to others may justly be compelled to pay what he owes. But no man can justly be compelled to pay what he does not owe. Benevolence does not pay a debt, but "gives" something that is its *own*. Every man is bound to pay what he owes. He is not, cannot be, bound to give. A gift is essentially free.

Every just act implies an obligatory conquest of selfishness.

Every benevolent act implies a voluntary and non-obligatory conquest of selfishness.

Benevolence always implies some kind of giving: the very essence of giving is voluntariness. How, then, can giving become obligatory?

We are naturally selfish. We can overcome selfishness only by thinking, by reasoning about the consequences of selfish actions. Consequently benevolence is self-originated. The sight of pain in others gives rise to sympathetic pain in ourselves. The sight of a man who has been severely

burned, and who cannot command needed help, gives rise, by sympathy, to a pain in ourselves. We know that the pain we sympathetically feel is small in comparison with that of the man who has been burned. We know, if we were ourselves in his place, how greatly we should suffer. We know how strongly we should desire appropriate help, and we desire to help him. But that desire is opposed by our selfishness,—too much trouble, expense. A struggle between selfishness and benevolence arises. We "think" about the man's state of pain, and we "think" about the trouble and the expense of ministering to his needs. If we oppose our own selfishness to the man's pain and need on the one hand, and the man's pain and needs to our own selfishness on the other, the result, whatever it may be, will have been determined by our "thoughts."

In the beginnings of benevolence, when psychological and moral power are, as yet, little developed, sympathy is mainly dependent on the *sight* of suffering, which, unless it be considerable, does not affect us, or only very little. But the more numerous are the conquests of selfishness by benevolence, the more sympathetic we become: we feel small pains in otners more keenly, and the more frequent and the more energetic are our efforts to remove or to alleviate them; and the less is our sympathy dependent upon the *sight* of suffering. Simple *knowledge of its existence* gives rise to a desire to effort for its removal. Every benevolent act being a conquest of selfishness, increase of benevolence implies decrease of selfishness. Sympathy becomes deeper, wider, more powerful. As we perceive more and more clearly the greatness of the misery present in human lives, the more we feel oppressed by its weight, and the more strenuous become our efforts to lessen its amount. Slowly—and in the beginning for the most part unconsciously—we begin to impose upon ourselves the obligation to do at least something for the benefit of others. Sooner or later we recognise it as *a voluntarily*

self-imposed duty. What shall be the extent and stringency of such voluntary obligation, each man necessarily determines for himself. With one man benevolence depends upon chancing to witness some suffering—not necessarily great—which gives rise to a momentary sympathy; as when, on some freezing winter's day, a warmly clothed man flings a copper or a sixpence to a poor beggar shivering with cold. With another it is the business of his life to seek to diminish the sum of human pain and sorrow, and to afford relief to the best of his ability, almost regardless of cost to himself. To such a man the sight and knowledge and thought of human suffering necessarily leads to consideration of the causes from which it arises. He not only desires to relieve it, but also to prevent its occurrence. He goes over the melancholy chambers of an immense building within which are immured two or three thousand persons in various states of insanity—"patriarchies" in which the "parent-ego," either by its own fault, or by the faults of its parents, who have dowered such patriarch-ego with disease, which it has in its turn transmitted to its child-egos, or by misfortune, is unable to govern, unable to provide for its child-egos or itself, and so has to be deprived of its liberty for its own good and for that of the community. He slowly passes through the successive wards of a great hospital, in which he sees patients enduring the endless varieties of physical pain which the human frame can suffer through disease or through accidents. He finds his way into the gaol, into the den of the sweater, and into the foul habitations of the extremely poor. He groans over the long hours of labour, which in so many cases yield in return only the bare means of existence—often not even so much. He sees the awful inequalities of life,—the too-much of some, the too-little, even the none-at-all of others. In some noble hearts the sight and the knowledge of these things give rise to a passion of pity and love, to a dedication of themselves and what they possess to the service of suffering

man,—which is the service of God,—*to the voluntary imposition upon themselves of the obligation to "go about doing good."*

Pondering upon the causes of human misery, he perceives that it arises from injustice, folly, ignorance, weakness of body and mind, indifference of some to the sufferings of others, absence of love, accidents; and he also perceives that none of these causes are irremovable, except the last—"accidents," to which man must always be liable. But he sees that man is capable of self-acquiring more and more knowledge of physical nature, of its properties, its laws, its modes of action and interaction; and consequently of arranging and directing its powers and forces so as continually to decrease the probability of accidents. With a great glow of emotion he perceives that all *other* causes of suffering are also capable of gradual diminution. Increase of knowledge means decrease of ignorance; increase of psychological evolution means decrease of folly. He perceives that the causation of suffering is not an inherent property of things. Injustice is not a thing, not an entity—for if it were it would be indestructible—but a quality of an action. He perceives that every man, in virtue of being able to create the conception of justice and the concomitant obligation to act justly, and by the exercise of the creative power of thinking to create motives, is able to self-evolve just actions, is able to learn to compel himself to act justly, and to refuse to himself gratification of such desires as cannot be attained without injustice—which means undeserved pain—to others. He sees that man is capable, by sympathy with the sorrows of others, of conquering selfishness and indifference, and of learning to exercise that ability with increasing frequency. He sees how conscience, which is the application of justice and love to actions, becomes more and more powerful, and that there is nothing in the inherent nature of things to prevent conscience from becoming the supreme arbiter of actions, the governing

principle of life. He perceives that the self-originated and self-sustained continuous evolution of knowledge and justice and love, by the gradual conquest of the causes of human suffering—injustice, folly, ignorance, weakness of body and mind, indifference of some to the pains of others, absence of love—necessarily tend to the continuous evolution of happiness; tend to render the relations of men to each other to become such as are embodied in the two great laws of conduct: the law of justice—Do unto others as you think they ought to do to you; and the law of love—Do unto others as you would desire others to do to you.

He sees that Man exists for the Self-acquirement of Knowledge, for the Self-evolution of Justice and Love, and through their action the Self-evolution of Happiness; and we have the ANSWER to the QUESTION, "WHY DOES MAN EXIST?"

CHAPTER LX.

MORAL RELATIONS BETWEEN GOD AND MAN.—MAN OWES GOD NOTHING.—GOD OWES MAN HAPPINESS.

By an act of Creational causation God caused the primal Life or Soul, the first vegetable amœba, to begin to be.

God created that First Life or Soul with certain powers or abilities. One of these was the power to reproduce its like. Each reproduced Life had, like its parent, this power to reproduce its like. Out of the exercise of this and other powers possessed by Life, there arose—by processes of Evolution—all the various kinds of plants and animals which have existed in the past, and those which at present exist. Of these, incomparably the highest is man, who is the outcome of the exercise, the actions and the interactions of the sum of all the powers, vital and physical, psychological, physiological and moral, which respectively belong to Matter or to Life.

God is, then, the Final or True Cause of man's existence, and may be said to be the "parent" of man. Man, and indeed every Life or Soul, is His child.

Our consideration of the moral relations between human parents and their children led us to the conclusion that the child owed its parents nothing—with the single exception of obedience; that as the parents, for their own pleasure, caused the child to exist, and as the child cannot at birth, or for a long period afterwards, sustain, support, educate itself, the parents are in justice bound to care for it until such time as it can care for itself. If they discharge

such obligation imperfectly, or altogether fail to discharge its they inflict upon it a frightful injury.

But it is possible for the child to take a still higher view of the obligations of its parents to itself. It may say: "You caused me to exist,—you are responsible to me not only for my well-being and education up to the time of maturity, but for the whole of my life. My nature, which I derive from you, is such that I have a great number of desires, all of which, directly or indirectly, have happiness for their object. My own nature, and the nature of the conditions and circumstances in the midst of which I live, are such that the amount of happiness I experience is extremely small, while the amount of pain I experience is great,—sometimes so great in comparison to happiness that Life seems to me to be not worth living."

In the causation of living creatures there seems to be present a radical injustice, which is—that their existence depends entirely upon the will of that which causes them to exist, instead of upon their own will. It ought, in justice, to be within the option of a man—and of every other creature—whether he will exist or not. It will be replied that such option is impossible, indeed, inconceivable. True, it is so. It is also true that a just being cannot justly cause another being to exist without being first certain that such being, if it had been within its choice, would have freely chosen to exist. If existence and happiness had been synonymous, then a man would have no cause of complaint against that which caused him to exist. It is because there is in life so much misery, that man complains, and is entitled to complain, of that which caused his existence. He says that as man had no share in causing himself to exist, and as God created man for His own pleasure, and created him with the desire for happiness, man "owes" God nothing, while God "owes" man happiness. If He does not discharge that obligation, though He may be called powerful He cannot be called just. The best that can be said

of the Universal Father is, that He is alike indifferent to the happiness or the misery of His children. In a human parent such indifference would be called a crime.

—Unless, indeed, there should come a time when man—and not only man, but every other creature, whether living in this world, or living in those states and in those conditions, whatever they may be, into which they enter on leaving this world—shall say: "Notwithstanding all we have suffered, all we may still have to suffer, we prefer existence to non-existence. If it had been possible for us to know beforehand what would be the result of being born, we should have *chosen* to be born. There was a time when, in our ignorance, we believed that God might be malevolent, was certainly indifferent, was certainly unjust; now we understand—however imperfectly—that He is perfect knowledge, perfect justice, perfect love. We understand that He created Life, Soul, that it might by its own self-action acquire knowledge, evolve justice, evolve love; that it might make *itself* good; that it might make itself, through the eternities, become more and more like Himself—might become more and more good, more and more happy; that it might fulfil the desire of the Creator, which is first its goodness, and through goodness its happiness. God did not for his own benefit, for his own pleasure, for his own glory, cause man to exist; but that man might, by his own free action, make himself good and happy, and love Him more and more for ever."

To which the unhappy wretch groaning under the unbearable ills of Life replies: "No doubt such would be a 'vindication of the ways of God to man'—if it were true. But it is not true: it is a mere dream, a figment of the imagination, an absurd conjecture, unsupported even by the ghost of a shadow of probability—let alone of proof. Love Him! what possible reason can we have for loving a Being who is absolutely indifferent to our sufferings, and who has inflicted upon us the inexpiable injury of causing us to

be? Man, moved by sympathy with his fellows, conquers his natural selfishness, and helps them. God is indifferent. Which do you think is the nobler being?"

Taking it for granted that God desires the existence of truly good beings, but that the nature of true virtue is such that goodness must be self-originated, we cannot help seeing that, however benevolently God may *feel* towards us, He cannot be *actively* benevolent without defeating the object for which He caused us to exist; so that, though God's feeling for us may be wholly loving, yet, as His love cannot be made perceptible to us by action, He may—while loving us wholly—seem to be entirely indifferent.

Is there any possible way of discovering whether God's indifference is real or only seeming? or that perfect love is present, but, being debarred from even the smallest active expression, presents an appearance which cannot be distinguished from perfect indifference?

When the Priest and the Levite "passed by on the other side," the wounded traveller would rightly infer that they were indifferent to his sufferings, while the Samaritan had compassion on him and showed his sympathy by benevolent actions. But suppose the Samaritan, while *having* the benevolent feeling, the desire to help the poor wretch, whose pains he felt as if they had been his own—while having a strong desire to express his benevolence by actions—had, from some cause, been entirely *unable* to do so, and had, but with an aching heart, like the Priest and the Levite, "passed by on the other side," would not the unhappy sufferer have inferred that the Samaritan was, like the Priest and the Levite, "indifferent" to his pain? Yet his inference would have been erroneous. May not our inference that God is indifferent to human suffering be as erroneous as would have been that of the wounded man in the case of the Samaritan?

No doubt, under the supposition made, the inference drawn by the wounded man that the Samaritan, like the

Priest and the Levite, was indifferent to his suffering, would have been erroneous; but the cases are not analogous. If the Samaritan had passed by on the other side because he was "indifferent," he would have committed no injustice, for he "owed" the wounded man nothing. He was free to be indifferent. But God is not free to be indifferent to man. He is his Father, his Creator, and owes him justice, owes him happiness. We see that man is not happy. The Soul, in the midst of its distresses, cries out in vain for help from God. The miseries of Life crush it to the dust. It cannot rest without some solution of the awful problem of existence. It seeks for God, and finds that God exists. But to what good? it asks. What better are we for a God who, having caused us to exist, is yet unjustly indifferent to our sufferings, who has left us to struggle on blindly in the darkness? Better not to know Him at all than to know Him and to find Him indifferent and unjust. How can we be sure that He might not for His own purposes "desire" the existence of just beings without being Himself just? The wickedest man would wish all other men to be just and good, because it would be advantageous to himself. It is conceivable that the spectacle of the struggles, the anguish of souls overpowered by the weight of physical, psychological and moral difficulties and sufferings, slowly, slowly, through the ages working their weary painful way upwards, their defects and their mistakes, may have for God merely the interest of a great tragi-comic drama. The immeasurable miseries of man, the burning tears, the excruciating agonies, the bloody sweat, touch Him not. *They cost Him—nothing.* He suffers nothing. He is only a spectator. There is not the smallest reason for supposing Him to be other than indifferent. In Shakespeare's tragedy of *Macbeth*, Macduff —when Macbeth murders Duncan and usurps the throne—flies to England. When Rosse arrives there with tidings from Scotland, and Macduff inquires after his wife and children, Rosse replies :—

"Let not your ears despise my tongue for ever,
Which shall possess them with the heaviest sound
That ever yet they heard. . . .
Your castle is surprised; your wife and babes
Savagely slaughtered: to relate the manner
Were on the quarry of these murdered deer
To add the death of you. . . .
Macduff. My children too?
Rosse. Wife, children, servants, all
That could be found. . . .
Macduff. My wife killed too?
Rosse. I have said. . . .
Macduff. . . . All my pretty ones?
Did you say all?—O hell-kite!—All?
What, all my pretty chickens, and their dam,
At one fell swoop? . . . Did Heaven look on,
And would not take their part?"

"Does God look on, and will not take our part?" is man's despairing protest against God's indifference to human suffering.

Sympathy, or feeling pain at the sight (or thought) of the suffering of another, is not benevolence, but only the *possible occasion of benevolence.* As benevolence arises out of sympathy—whether excited by sight or thought or knowledge—we have unconsciously come to think of sympathy as if it were synonymous with benevolence, which clearly it is not. It is only the *condition* of benevolence, not its cause; for without sympathy there can be no benevolence.

Man, moved to sympathy by the sight or the thought or the knowledge of the sufferings of his fellow-man, desires to help him, overcomes his natural selfishness, and makes sacrifices for his benefit. God sees man's sufferings, but does nothing to relieve or to alleviate them.

As the whole history of things affords us only a single

instance of God's action—that of the creation of the first Life or Soul—it is only by inferences drawn from the existence, the nature and constitution of that Life (so far as we know them), and from the history and character of the development of that Life or Soul, that we can form any opinion of the character and causes of action of its Creator.

The first conclusion we reached was,—That God had so constituted Life or Soul—of which man is the highest development—that the natural object of its action should be the attainment of happiness and the avoidance of misery. When the action of the sex-power gave rise to numbers so great that the means of subsistence became inadequate for their support, the struggle for existence and the survival of the fittest commenced. Every creature sought the satisfaction of its own desires, irrespective of pain inflicted on others. Every creature sacrificed other creatures for its own benefit, or was sacrificed by other creatures for their benefit. Cruelty and carnage were universal, and selfishness reigned supreme.

With the creation by a soul of the "thought" Justice, the action of selfishness began to be more or less limited by moral judgments—collectively called conscience—which is the application of Justice to actions, and expressed in the "judgment" that we ought not to act towards others as we think others ought not to act towards ourselves. The desire to act justly conflicts with selfishness, and the result is a moral struggle between man's self-imposed obligation to be just and his desire for the gratification of desires irrespective of injustice to others.

The effect of unjust actions is always more or less pain to others, or to the actor, or to both; and pain is only another name for misery or unhappiness. Complete injustice in all creatures produces the maximum of unhappiness. As injustice decreases, happiness necessarily increases. God has endowed Life or Soul with the power to create thoughts.

It has created the thought Justice, and imposed upon itself the obligation to act justly; and we perceive that, though God has not created Life or Soul in a state of happiness, He has endowed it with power to modify its own states and circumstances in such ways that its happiness may increase indefinitely. God must therefore have *intended* such increase; and the contention of pessimism that God must be malevolent is thus, I think, *proved* to be erroneous, for we cannot suppose that a malevolent Being when He created Life or Soul subject to a certain amount of misery, would so constitute that Life or Soul that it should possess within itself the power so to act as eventually to decrease, perhaps at last to extinguish, that misery.

And that is not all.

Injustice hurts, harms, injures those who suffer it. It causes pain, misery, unhappiness. Justice—which we self-mpose upon ourselves, and is also imposed upon us by others—forbids us to wrongfully cause misery or pain to others, but it does not impose upon us any obligation to *help others* instead of harming them. It does not impose on us any obligation to remove or to alleviate that pain at the cost to ourselves of some sacrifice of time, money, goods or labour. But out of "sympathy" arises the desire to benefit others, "to do them good," to conquer our own selfishness that they may be the better, the happier,—desire which finally leads to the *voluntary imposition* upon ourselves of the *obligation* or *duty* to act to others in need of help as we would wish them to act towards ourselves if we were ourselves in states of pain or need or sickness or sorrow.

Justice inflicts no wrongful pain.

Benevolence, Love, not only inflicts no wrongful pain, but desires to diminish misery and to increase happiness. To attain these objects it necessarily has to conquer selfishness. The application of the principles of Justice and Love tends to increase by exercise, and conscience becomes more and

more powerful. We can suppose Justice and Love to become so completely dominant that the only sources of pain to man will arise from physical causes, and that all will be united in their efforts to reduce the effects of such causes to the smallest amount possible, and man, by means of the self-originated moral elements of Justice and Love, well have worked out his own goodness and happiness, and so have fulfilled the "Desire" of God.

Man owes God nothing, and God owes man happiness. When man becomes happy, can it be said that God has "paid" His debt, and that He is not indifferent to human suffering?

The answer to that question must certainly be in the negative. When Life or Soul attains to such a height of knowledge, of benevolence, of love, that the conquest of selfishness in its innumerable forms of injustice, cruelty, lying, robbery, oppression, greed, lust, gluttony, unchastity, indifference to the sufferings of others, is completed, that conquest will have been achieved by its own acts, by its own sufferings; but at what a cost of blood and tears let the history of evolution through the struggle for existence and the present state of the world declare!

But some one may say,—Supposing, as you assert, that man has, without assistance from God, without even His sympathy, worked out his own salvation, is he not still indebted to God for the ability to do so? was not such ability His "gift"?

No, it was not, could not be, His "gift." The First Life —and by implication all the lives which have arisen from it—was created, caused to be, exactly as God *chose* to constitute it, and the conditions in the midst of which it should exist and evolve itself. A "gift" can be made only to some creature *already existing; a gift cannot be made to non-existence.*

That that which is created should, by being created, incur any debt or responsibility of any kind whatever

to that which created it, is absolutely inconceivable. The Creator of a conscious existence who so constitutes it that it desires happiness is bound—that is, if He is a just Being—to provide for the gratification of its desire. No one will maintain that it is either just or benevolent to cause a creature to exist for the sake of its being unhappy. The smallest amount of misery experienced by a conscious creature during the whole of its existence would be a *proof* that its creator was—to that extent—malevolent.

Our study of the phenomena of Life leads us to the conclusion that the *condition of evolution is that of service or sacrifice*,—involuntary, or voluntary, direct or indirect. The whole of the vegetable kingdom is sacrificed to the service of the animal kingdom. Each animal is sacrificed to the evolution of a higher; hence the continuous and universal suffering. Vegetable organisms and the lower forms of animals, having but little capability of being conscious, suffer little. But higher development means greater ability to suffer; and man, being the most highly developed creature, is capable of the greatest suffering.

What has been the amount and the intensity of that suffering, physical, mental and moral, is beyond calculation; *sometimes* the mere thought of it is unendurable. Everything seems to force upon us the belief that God is wholly indifferent to our pain, and excites in us a feeling even of hatred. The Universal Father owes His children happiness; He has not discharged that obligation; He is still in our debt, while we owe Him nothing. If humanity ever attains to happiness, it will not be owing to God, but to the sacrifice and service of the countless millions of its dead ancestors who have lived and suffered and died for its benefit. We owe God no gratitude, no love; we ignore Him; we turn our backs upon Him; we repudiate Him. For man He has no sympathy; for his sake He does nothing, suffers nothing; He is wholly indifferent.

Are we quite sure of that?

CHAPTER LXI.

MAN SUFFERS: GOD SEEMS TO BE INDIFFERENT. IS THE INDIFFERENCE REAL, OR ONLY SEEMING?

We have just seen how, by the application of self-acquired knowledge of physical and vital modes of action and interaction, physical pains may be gradually limited to such as result from what we call accidents. We have seen how, by the action of self-originated justice and benevolence, moral evil and the sufferings resulting from it may be gradually diminished, or even extinguished, and happiness become more or less complete; from which it follows that God cannot be wholly indifferent to our sufferings, or He would not have endowed Life or Soul with powers,—present in every life or soul, but developed only in man,—by the use of which man would be able to make himself good and wise, and through goodness and wisdom, to make himself happy.

If the postulate,—that God desires the existence of good or virtuous beings, but the nature of true virtue being such that it can arise only by self-origination, God cannot create or make good beings, but can and does create beings who can make *themselves* good,—be true, we have an intelligible solution of the problem of Life; for we see that man, from his original state of complete though innocent wickedness, has to a certain extent made himself just and benevolent—has to a certain extent made himself good, and must, through the increasing action of such self-caused goodness, tend to become more and more good, and more and more happy.

Man in the beginning being entirely selfish, he can become truly just and benevolent only by conquering selfishness through causes absolutely originated or created by himself. If a man, by the action of some power introduced into him from without, achieves some conquest of selfishness, such conquest is not due to himself, but to that which imparted to him *that* by means of which the conquest was effected. His virtue would not be true—that is, self-created virtue—but a merely mechanical action; the action not of a "permanent" or self-acting "automaton," but that of a "machine" rendered "*temporarily automatic*" by the infusion into it of force from without, such "infused force" being the true cause of action. A locomotive engine or machine moves by steam put into it from the outside, and so does not cause its own motion. If a locomotive could "create" steam, it would be the "true," the "final cause" of its motion.

Such being the case, we can understand how it is that—the object of man's existence being the self-acquirement of knowledge and the self-origination of justice and benevolence—*God cannot help us. If He did, He would defeat the object for which He caused us to exist.*

But, even accepting the above as valid, man finds himself no nearer to God. If the creation of Life was consequent upon God's desire that good beings should exist; and if man, at the cost of appalling sufferings, makes himself good and so fulfils the desire of God, it follows that God's object was selfish and unjust, inasmuch as He sought gratification of selfish desire regardless of the sufferings of others. To urge that at some immensely distant period man will have become happy, is futile. Every individual life or soul has a right to happiness, and to the complete evolution of itself; and what becomes of all those lives which have been sacrificed for the sake of the evolution and the happiness of their remote descendants—happiness in which they can have no share? The terrible fact remains that man, to satisfy God's

"desire," suffers incalculable pain, while God suffers nothing.

In man the sight or thought or knowledge of suffering gives rise to sympathy, and the desire to relieve that suffering. If the desire be strong it enables him to conquer his natural selfishness, and to express such conquest in action having for its object the relief of the sufferer; and such action necessarily infers some form of self-sacrifice. If the sufferer be a person for whom the spectator has some feeling of affection, the willingness to sacrifice self will be in proportion to such affection. If the sufferer be very deeply loved, the desire to benefit may extend even to the sacrifice of the very life of the spectator. Affection deepens the capability of sympathising with the pain of another. When love is very intense, the *presence* of suffering in the beloved object is not needed to produce strenuous action; but the very possibility of their suffering gives rise to the most energetic efforts to prevent its occurrence. One of the most unendurable forms of human pain is the sight of extreme suffering of some one deeply loved, which it is powerless to remove or even to alleviate. Think of the husband bending over the couch of his tortured wife, writhing in the agonies of malignant fever, his heart sinking into the depths of despair while he listens to the incoherent ravings of delirium, the piteous moanings of intolerable pain. All that could be done has been done. The kindly physician is at last compelled to confess that there is no longer hope; and the husband has to look on powerless either to relieve the pain or to delay the departure of her who is the better part of his life, the great source of his happiness. Or—worse even than this—think of the pure, gentle, loving mother left a widow, with children so obstinate, so selfish, so turbulent, so disobedient, that all her efforts to shield them from evil, to keep them in the path of virtue, are frustrated. Day by day, year by year, she sees their progress along the downward path of evil. Her heart is oppressed with the darkest

forebodings of what may come to pass in the future. She does all she can for them, makes for them every possible sacrifice, but all in vain. She sees the light, frivolous conduct of her daughters leading rapidly to shame and misery. With her sons, dissipation and extravagance lead to debt, and debt leads to crime and its punishment. Can we measure the suffering of the mother as she sees her children become worse and worse, and has to look on, powerless to turn them from evil? the suffering of the husband, torn by anguish as—helpless—he realises that he must lose his soul's far better part, and hates the minutes as they quickly pass, because each brings the fatal moment of separation nearer,—hates them, because they move so slowly, lengthening the pain of her he loves so dearly. And when the last inevitable moment comes—when he receives the last kiss from those whitening lips, the last faint pressure of that almost powerless hand, the last, last look of love from those glazing eyes, and is left alone—he hates the cruel fate that deprives him of the very life of his life, the soul of his soul, the fountain of his happiness. Can we measure such suffering? Surely to have our hearts so full of love that we would shrink from no sacrifice that would relieve the sufferings or avert the dangers of those we love, and yet to have to look on their anguish absolutely powerless to help, is the worst pain we can be made to endure. Yet "God looks on, and will not take our part."

Nevertheless, we can conceive a deeper pain than even that.

A human organism consists of the patriarch-Ego—*the* Ego of the organism--and its child-egos. Each ego inhabits a cell or inner environment of protoplasm. Each ego-cell is external to every other ego-cell. Each child-ego, by means of nerve action, can make its states more or less perfectly known to the patriarch-Ego. The patriarch-Ego's experiences of the experiences of its child-egos being indirect, we can only suppose them to be more or less *like* the experiences of the child-egos; but such experiences of the

patriarch-Ego as *arise within itself* are known to it directly and completely.

We saw how the patriarch-Ego concentrates in itself—subject to the conditions stated above—the experiences of the whole organism. The amount of the experiences of an organism, and the amount of desires and actions to which they give rise, are the measure of its state of development or evolution—are the measure of its ability to suffer and to enjoy. Each child-ego is limited to its own direct experiences, nerve-egos to their own experiences and to experiences caused in them by the action upon them of other nerve-egos; parent-egos of ganglia to the action upon them of their child-egos; the highest ganglia to the action upon them of other ganglia; the patriarch-Ego to the sum of action of the whole organism; and, in addition to these, has its own direct experiences. Hence the greatness of its development.*

To the parent-Ego each child-ego bears a relation of place. It is nearer to or farther from it than other cells.

Each life or soul, whether considered as a simple protozoon, or as one of the aggregate of patriarch and child-egos, we call a human being—is a child of God. *What are man's relations of place to God?*

In the latter portion of the first part of this work I endeavoured to show that space is God's manifestation of Himself to us as Infinite; and that two or more entities can exist in the same place at the same time, and hence we are able to understand how the Infinite and finites can co-exist. I will quote the latter part of the argument.

As an instance of two entities existing in the same place at the same time, I wrote (p. 338):—

"In relation to this opinion let us consider the phenomena of gravity.

* Hypnotism commences with the stupefaction of the patriarch-Ego, and the substitution for it of the patriarch-Ego of the experimenter, who acts upon the child-egos by "suggestion," etc.

"In the hands of Newton the doctrine of gravitation assumed its final form, which is,—

"Every portion of matter attracts every other portion of matter, and the stress between them is proportional to the product of their masses divided by the square of the distance.

"That two homogeneous spheres of matter act as if the whole of the masses were concentrated at their centres.

"The mutual gravity of two bodies is entirely unaffected by the presence of other gravitating bodies.

"All objects fall with equal rapidity."

At page 339,—"Professor Jevons, in 'The Principles of Science' (page 514), speaks thus of gravity:—

"'Gravity is a force which appears to act between bodies through vacuous space; *it is in positive contradiction to the old dictum that nothing can act but through some medium.* It is even more puzzling that the force *acts in perfect indifference to intervening obstacles.* Light, in spite of its extreme velocity, shows much respect for matter, for it is almost instantaneously stopped by opaque substances, and to a considerable extent absorbed and deflected by transparent ones. *But to gravity all media are, as it were, absolutely transparent, nay, non-existent,* and two particles at opposite sides of the earth affect each other as if the globe were not between; *the action is, so far as we can observe, "instantaneous," so that every particle of the universe is at every moment in separate cognisance, as it were, of the relative position of every other particle throughout the universe at that "same" "moment" of "time."* Compared with such incomprehensible conditions, the theory of vortices deals with commonplace realities. Newton's celebrated saying, "*hypotheses non fingo,*" bears the appearance of irony; and it was not without apparent grounds that Leibnitz and the Continental philosophers charged Newton with re-introducing occult powers and qualities.'"

"At page 605.—'The gravity of a body, again, appears

to be *entirely independent of its other physical conditions*, being totally unaffected by any alteration in the temperature, density, electric or magnetic condition, or other physical properties of the substance.'

"That is, it is a 'power' which seems *to 'pervade' all things, to be present everywhere, to subsist at the same time in all matter and in all space, to subsist in all things the same as if no other force or power existed, to inhabit all bodies, molecules, particles, atoms, at the same time as all other powers inhabit them.* A Power and Force of which no atom can be deprived. A Power and Force into which no other Power or Force can be changed, though gravific force can itself be changed into other forces—as heat, for instance. Chemical affinity, heat, light, elasticity, cohesion, electricity, magnetism, polaricity, none of them can be changed into gravity. In vain did Faraday, the greatest chemist of modern times, bring to bear all the resources of his genius—of his wonderful imagination and exhaustive knowledge—in the attempt to "correlate" gravity with the other forces. To use his own words, 'the result was—*nil.*'

"Here, then, we have a Power and Force which *co-exist in the same place and at the same time with all bodies and their forces, and with space as well:* which I think amounts to a direct 'proof' that space is absolutely Infinite, and that the presence or absence of things makes no difference in its Infinity.

"It is no wonder that space is so wonderful—that we cannot think of it as non-existent, as having beginning, or end, or middle, or side, or limit; that it should be at once perceivable and unperceivable, unknowable and knowable—knowable as 'different' from all things, as 'containing' all things; that without it we cannot even 'suppose' any other existence; as that which not only 'contains' all things, but produces, 'creates' all things. Have we not seen a *new Power*—the power 'Life'—emerge from it? for Space—I tremble while I write the words—is *God.*

"God, Omnipresent, for Space is Infinite, and pervades all things; Infinite, for Space has no beginning, no end; Eternal, for its beginning or its ending are alike inconceivable. *In* all things, *through* all things, *creating* all things, *containing* all things, and yet—wonder of wonders, marvel of marvels!—*different* from all things. Not an 'anthropomorphic' Being, not a 'magnified man,' but a Being so inconceivably wonderful, that while He exists in our very presence, and with Him—in and through our very selves—every atom of us is in direct and unchangeable contact, we yet 'know' Him not! *Space is the mode in which the Infinite God manifests Himself to us*, and enables us to understand *How* it is that *in* Him we can '*live*' and '*move*' and '*have*' our *being*; how the finite can 'co-exist' with the Infinite, and the Infinite *remain* Infinite; how additions can be made to the sum of things, and the Infinite be Infinite as before."

"At page 30, 'Limits of Religious Thought,' Mr. Mansel writes:—

"'The metaphysical representation of the Deity as Absolute and Infinite must necessarily, as the profoundest metaphysicians have acknowledged, amount to nothing less than the sum of all reality. [*That* would be Pantheism.] "What kind of an absolute Being is that," says Hegel, "which does not contain within itself all that is actual, even evil included?" [Yes, 'contain,' but not in itself *be what* it 'contains.'] We may repudiate the conclusion with indignation, but the reasoning is unassailable. If the Absolute and Infinite is an object of human conception at all, this, and none other, is the conception required. That which is conceived as Absolute and Infinite must be conceived as "*containing*" *within itself the sum, not only of all actual, but of all possible modes of being.* For if any *actual* mode can be denied of it, it is "related" to that mode and "limited" by it; and if any *possible* mode can be denied to it, it is capable of becoming "more" than it now is, and such a capability is a "limitation."'

"According to the idea I have expressed in relation to Space, Space—or . . . God . . . is Infinite and Absolute before creating. Creation—seeing that space and things can exist together in the same place at the same time—'*adds*' *nothing* to the Infinite—*takes nothing away* from it. Under all circumstances it remains the same. The presence of created things, or their absence, does not in any way affect it. While it contains all things, it is the same as when there was nothing but itself. But it is not the 'sum of all reality.' It only 'contains *within* itself all possible modes of being'—and 'all actual modes of being—evil included;' but the (attempted) solution of the existence of 'evil' in God—for all things 'exist' in God—has to be by-and-by considered when we come to the question,—Why does man exist? But though all things exist in God, they are not therefore portions, or elements—how shall I express it?—of God. They co-exist in the same place, but they are not identical with God, whose Infinity is not affected by that which He creates, that is, causes to be."

Page 350.—"St. Paul says, 'that they [men] should *seek* the Lord, if haply they might *feel* after Him and *find* Him, though He be not far from every one of us; for in Him we live and move and have our being.'

"I think the latter words express what we may call *scientific truth*, for our bodies are indeed the 'temples of God.' God is not only 'not far from every one of us,' but *in Him* we scientifically—physically—intellectually—metaphysically—morally—'Live and Move and Have our Being.' We are apt, even while we speak of God as Infinite, to think of Him as being afar off, that when we pray to Him our prayers have to ascend to Him to some inconceivable elevation,—to some inconceivable distance. We never seem to realise that we are,—and cannot but be, in actual contact, actual touch with Him. But such words feebly express the reality, for God is in and through all things, not only the human soul, but all—all

—all things; there is no thing, no place in which He is not."

This is the true doctrine of the "Real Presence."

If, then, God is Infinite, and therefore omnipresent,—if all things are contained in and co-exist *with* God, and are *identical in place with Him*, it necessarily follows that God must be present in and know all the actions and reactions of physical substances, must be present in all the actions and reactions of all lives or souls upon each other, must know all that man and every other living creature does and feels and thinks, *and also all that they suffer.*

How does man's suffering affect God?

In endeavouring to answer that question we can have recourse to three things: the nature and history of things and of lives; analogies and inferences drawn from these; and our own experiences.

The patriarch-Ego of a multicellular organism—from the lowest up to man—suffers pain from three principal causes: pain arising out of its own direct experiences; pain arising out of experiences caused in it by the action upon it of its child-egos; and pain arising out of sympathy with the pain of others.

There is thus only *one direct* cause of pain—namely, pain which arises directly from causes present in the patriarch-Ego itself. We have pain indirectly caused in us by sympathy with our child-egos, or with the pains of others. To us, every other ego—whether it be a child-ego of our own, or a patriarch-ego or child-egos of other patriarchies, is wholly external. But with God all physical things and all lives and souls are INTERNAL, and all that every individual patriarch-ego and child-ego does or feels or thinks or suffers, *must*—seeing that "in God we live and move and have our being," be *simultaneously experienced by God, not merely through "sympathy," but by "direct" experience. He is not a mere "spectator," but suffers all that man and all other living creatures suffer*,—nay, infinitely more, for

as we have seen, the higher the creature, the greater the capability of suffering.

What must be God's ability to suffer compared with that of man?

But, it may be objected, that which causes pain in us may not cause pain to God. For instance, though the sun with all its fires must exist in God, you would not assert that their existence in God would cause Him to feel pain? while, if a *man* puts his finger into the flame of a burning match his pain is great. Would God feel that pain as the man feels it? Before I can answer that question we must clearly understand what pain is.

Pain is not a thing, an entity. It is a "state" of a conscious Ego. The man and the burning match alike existed and acted in God before the man put his finger into the flame. When he did so it gave rise in him to a "mental state," which we call pain. It was not the burning, but the "state" of pain produced in the man by the burning, which gave God pain. All pain is mental. The *cause* of pain is physical or mental as the case may be: physical,—as in the case of the burning match; mental,—as when pain in a man is caused by memories, imaginations, thoughts. We cannot suppose that God suffers pain from any physical causes whatever, but only from *experiencing all those mental states of living creatures which we call pain or suffering*. That knowledge may be self-acquired, that justice and love may be self-evolved, costs *every* individual life or soul a certain amount of suffering—varying according to its development. It costs God an amount of suffering equal to that suffered by the total sum of all lives. Each individual life suffers only its own individual pains, but God suffers all that all the lives that ever have existed or will exist have suffered or will suffer,—suffering extending over the millions of years which have elapsed since He created the first life, and which will endure so long as lives continue to suffer.

But the suffering which God endures that man may be able to make himself good is not a merely *equal quantity* to that suffered by the sum of lives.

We have seen that the capability of suffering is contingent upon the state of development. The higher the development the higher the capability of suffering. A given cause which produces little pain in a jelly-fish will in a man give rise to great pain. Pain is a mental state; and as the mind of God is inconceivably greater than the mind of man, so must God be capable of pain inconceivably greater than is possible to man.

We have seen that the worst pain a human being can experience is that of looking on, helpless, while those we love suffer. We can suppose that pain to become intolerable if we possessed the power to cause that pain to cease, but were, from some cause, unable to exercise it. What must be the pain of God, who has not merely to witness but to experience all the pains of all His children; and yet—though able to cause all that pain to cease—for the sake of that self-caused goodness which cannot be worked out except at the cost of suffering, withholds His hand? and at last we understand that what seemed to us to be "criminal indifference" is in truth the expression of boundless self-sacrificing love.

Nor is this all. We see how God—being infinite and eternal—suffers all that man and all other creatures suffer with a suffering proportionate to the difference between Himself and them. But what must be the suffering of God,—absolutely pure, loving, just,—caused not merely by human suffering, but by human *wrong-doing*, by "guilty" wickedness, by true, self-originated vice. We could understand and sympathise with the pain of the tender, pure, unhappy mother compelled to witness the gradual moral and physical ruin of her children. But suppose, instead of witnessing only the *effects* of evil, she had been present as a spectator in the mind, the Ego, of each of her children, and

had been as much present in every wrong act committed by them as they were present themselves. Suppose she had to be with them in all their shame, in all their crime, in all their punishment.—present in the life of infamy of her daughters, present in each act of villainy of her sons—her life spent in witnessing evil, every feeling of purity and goodness continually outraged, and yet continuing to love them with a love which was indestructible, which, though her heart was one wound, could not die. We can imagine something of what would be her anguish. But we cannot conceive the pain caused to God by the wickedness of man, all of which is committed *in* God.

The cost of self-evolution of goodness by man is the sum of the suffering of man and all other lives and the suffering of God. I cannot find any words by which to express my conception either of the greatness of that suffering, or of the greatness of God's love for man. I can scarcely bear even to allude to the supposition that God is indifferent to the suffering of man, further than to dismiss it as needing no further reply. I have said that, "ethically considered, what costs little is worth little." What must be the intrinsic worth of that "goodness" which "costs" so much? Even in this life, it is for some of us "worth" more than happiness. I believe that in the future life there will be a continuous unfolding of its transcendent value. Through God's self-sacrifice we see that man is able to make himself good. When we understand the goodness, the love of God, we learn something of the Divine nature, and that the more good we ourselves become, the more shall we be in harmony with God. Wickedness means the unjust infliction of suffering, means being in discord with the Divine nature, with God's absolute goodness and purity and justice and love.

CHAPTER LXII.

WITHOUT GREAT SUFFERING OF MAN AND INCONCEIVABLE SUFFERING OF GOD TRUE HUMAN GOODNESS WAS IMPOSSIBLE.

We see that, although God owes man happiness, man is not happy ; but recognising God's love in His self-sacrifice for man, a deep love for God springs up in our hearts, and together with that love a perfect faith in His justice. We feel assured that when so great a love is present it is not possible that there should be any failure of justice. We see that the great principle of evolution, from the amœba up to God Himself, is service,—sacrifice. The higher evolves itself at the cost of the lower. All lives or souls are capable of the same evolution, and have a right to complete evolution. The child-egos of a human patriarchy are capable of the same evolution as is reached or will be reached by the patriarch-Ego, nevertheless they are sacrificed for the benefit of the patriarch-Ego. For endless service and sacrifice is there to be no payment ?

In the beginning all creatures were entirely selfish. That selfishness,—which sacrificed others for its own benefit,—increased with increasing evolution. With the evolution of the multicellular organism there appeared a modification of selfishness in the form of the mutual service of the patriarch-Ego and its child-egos ; but in relation to all other organisms the sacrifice by every organism of every other organism for its own benefit was the one principle of

action. With the origination of morals through the conception of justice, selfish sacrifice of others for the benefit of ourselves received its first direct check. Out of justice grew love, and out of love grew a new principle,—the principle of *voluntary self-sacrifice* for the benefit of others, instead of the sacrifice of others for the benefit of ourselves, —the principle that if we benefit by the sacrifice of others, though such sacrifice may have been involuntary, though there may have been present in that which was so sacrificed no thought of benefiting ourselves, yet if we recognise and reap such benefit, we may voluntary impose upon ourselves the obligation to repay that benefit.

But such repayment cannot be made to the dead—that is, if death means ceasing to exist. The possibility of holding the opinion that what we call death is the cessation of the existence of that which we call Life is contingent upon the correctness of the supposition that Life is the result of some particular arrangement of certain atoms, and the resulting action of their forces; and that, when from any cause such arrangement is broken up, or in some way so changed that the action which we call Life is impossible, there is no longer Life. With those who hold this opinion, Life is not an *addition* to the sum of existences, but only *a particular arrangement* of things and forces already existent; and death is not the ceasing to be of any thing or things, but only the cessation of an "arrangement," Life is, for such, only an instance of "changal causation," not of "creational causation," which means the causation of the beginning-to-be of some entirely new existence,—but only a particular arrangement of things already existent; from which it would necessarily follow that the only thing that hinders the chemist from originating Life is, that he does not know what are the numbers and kinds of atoms and the way in which they have to be arranged. If he did, he could of course produce Life. The "arrangement" of atoms effected by "Life" is called protoplasm. If the

chemist, like Life, could make protoplasm, he believes that Life would be the result; for Life, he says, is merely a "property" of protoplasm. The fatal objection to which is, that protoplasm never lives at all. If the "power" Life be *present* in protoplasm we conventionally say it lives; if the "power" Life be *not* present, we say it is dead. If Life were "a property" of protoplasm, we could never say of existing protoplasm that it is dead. Life can and does make protoplasm, but protoplasm cannot make Life. As no combination or arrangement of physical substances and the action of their powers can produce Life; as the only source of new Life is some antecedent Life; as once there was no Life, and yet Life appeared,—we are compelled to refer its commencement to a Creator, whom we call God. For the considerations and reasons which lead to these conclusions I refer the reader to the nineteenth chapter of the previous volume of this work,—"Whence comes Man: from 'Nature' or from 'God'?"

The solar system is composed of atoms. No atom, so far as we know, ever goes out of existence, or loses any of its powers—gravity, cohesity, polarity, etc. The doctrine of the uniformity of Nature is based upon the indestructibility or immortality of atoms and their powers. They, like Life, were created by God. The only way in which we can conceive an atom to cease to be is by the action of God. Only the Creator can be the annihilator. If atoms are immortal, shall we consider lives—for the sake of which atoms exist—to be mortal? Mortality—or ceasing to be—either of atoms or of lives, except by the act of God, I hold to be unbelievable.

We could be what we are only at the cost of all the suffering and death of those who preceded us. *Justice* commands no repayment, because those who suffered and died had no thought or desire or intention to benefit us. But we have *had* the benefit, and *Love* commands repayment. We can make such repayment to the dead only when we

have ourselves died. We see that, as selfishness is gradually conquered, Love leads to efforts to benefit those who suffer. We see some who devote themselves to the service of man—which is the service of God. Are we to suppose that evolution ends with this life? Not so.

In this world we are in the first stage of existence. The higher the moral evolution,—whether attained in the world, or during the modes of existence into which we enter when we quit this world,—the greater will be the efforts to benefit others; to lift up instead of treading down; instead of sacrificing others to self, to sacrifice self to others: efforts continued through the life after this life till all living creatures—vegetable as well as animal—have reached their highest vital and moral evolution; till every debt of every creature to every other creature has been paid by Justice and Love; till man is in harmony with God, till he has become what God "desires" he should be; till that first stage of Life is completed, at the end of which shall commence that second, that higher and grander Life, which has cost all lives, and God Himself, such awful suffering.

What will be the nature and mode of that second stage of existence we can scarcely even conjecture. But of one thing I think we may be certain,—that whatever else it may be, it will be an existence which can be experienced only by such as are Good, and that it will at least be "worth" what it has cost; that it will be a state *in which God can pay to man the debt of happiness due to him.* Whether such payment will be in the form of some state of intense blessedness, or in the privilege to rise to some higher development of knowledge and goodness purchased at the cost of even higher suffering than we have ever experienced, we cannot tell. The most wonderful thing in Life is, that although the desire for happiness would seem to be the very root-principle of our nature, yet God has given us the power by creating thoughts to create goodness,

and by slow degrees to learn so to love goodness that when happiness and goodness conflict, we prefer to be good rather than to be happy. In his perfected Life it may be within man's option to choose virtuous happiness for himself or self-sacrifice for the good of others. Like God,—with whom he is in harmony,—he may choose the latter. As God has chosen to suffer that man may become good, so man may choose self-sacrifice for the benefit of others rather than happiness for himself.

At the close of the previous volume (page 352) I wrote:—

"Before replying to the question with which we started—the question, 'Whence comes man? from "Nature" or from "God"?' we must, I think, state what man is.

"As it seems to me, man is the highest development of the 'Power' called 'Life,'—a power added, at a comparatively late period of geological time, to powers already existing.

"To the question, then—'Whence comes man? does he come from Nature or from God?' we must, I think, reply:

"That not only man, but nature also, owe their existence to the Infinite Eternal Being—GOD, who 'created' all things.

"Supposing these answers to be accepted, other questions suggest themselves. We want to know why man exists. We want to know why God created him. Did God desire that man should be good? Is there any reason why he *should* be good? If there be, then why does evil exist? And then arises, also, the further question: that supposing there be a good reason why man should be "good," and if it is desirable that man *should* be good, is goodness possible to him? If his "character" be made *for* him, not *by* him, how *can* he be good if his character, which he did not make himself, be not good? Does his existence terminate at death? Does he come into this world only for the sake of what he therein does, suffers, enjoys? or is his existence continued

after death? Is that existence, if it *be* continued after death, to be desired or dreaded? Is the having been born a misfortune or a blessing? What is the character of God? Is he a Being to be feared, to be hated, or to be loved? What are man's relations to his fellow-man? What are man's relations to God?—that awful Being whose power over us seems to be absolute;—and that last, most terrible of all questions: Is man's existence owing to God's malevolence, to His indifference, or to His love?"

All these questions, and others arising out of or connected with them, I have endeavoured to answer. I have endeavoured to show that God desires the existence of good beings, but the nature of true goodness or virtue being such that it must be self-originated, self-caused, God cannot make or create a good being, but can create a being which shall be able to make *itself* good, but only at the cost of its own and of God's suffering, and that man exists for the self-acquirement of knowledge and the self-evolution of justice and love. That he may be able to effect these objects God has gifted him with creative power—the power to create thoughts. By the creation of thoughts he is able to create motives, and—in so far as his actions result from such self-originated motivation—thus becomes *the final or true cause* of such actions, whether they be good or evil.

The processes of evolution began with the sacrifice of others to self. It will be gradually consummated by the sacrifice of self to others, by the payment of all debts owing to those who have been sacrificed for the sake of others, whether in this life or in that which is to come; till every soul has reached its complete mental and moral development; till the desire of God is fulfilled; till we commence that second stage of existence, which will doubtless be followed by others, rising higher and higher through eternity, each one inferring a continually increasing harmony with and love for God, who is a Being not to be "hated," not

to be "feared," but to be "loved" with an entire trust and devotion.

Man's relations of duty to man are that all his actions shall be just and benevolent; that he shall do all that lies in his power to serve his fellows, to make them wiser and better and happier. Man has no duties to God other than the self-imposed voluntary obligation to love God because God loves man—loves him with a love which expresses itself in His inconceivable self-sacrifice in order that goodness, and through goodness happiness, may be possible to man. As God's "desire" in relation to man is that he shall make himself good, the only way in which we can "serve" God is in helping on the fulfilment of that desire. To serve man is to help to fulfil that desire; and hence it follows that the service of man is the service of God: the two things are absolutely identical. Whoever serves man, in serving man serves God.

I think we cannot doubt that the time will come "when not only man, but every other creature, whether living in this world, or living in those states and in those conditions —whatever they may be—into which they enter on leaving this world, shall say: Notwithstanding all we have suffered, all we may still have to suffer, we prefer existence to non-existence. If it had been possible for us to know beforehand what would be the result of being born, we should have *chosen* to be born. There was a time when, in our ignorance, we believed that God was malevolent, was certainly indifferent, was certainly unjust. Now we understand, however imperfectly, that He is perfect knowledge, perfect justice, perfect love. We understand that He created Life, Soul, that it might by its own self-action acquire knowledge, self-evolve justice and love: that it might make itself good; that it might make itself, through the eternities, become more and more like Himself; that it might become more and more good, more and more happy; that it might fulfil the desire of its Creator, which is first its goodness,

and through goodness its happiness. God did not cause man to exist for His own benefit, His own pleasure, His own glory,—seeing how great to God is the cost of his existence, —but for man's benefit: that man, by his own free action, might make himself good and happy; might learn to know and to love Him more and more for ever.

THE END.

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"WHENCE COMES MAN?"

OPINIONS OF THE PRESS.

THE ROCK.

November 22nd, 1888.

THE author of the volume before us is a bold, original, and accurate thinker. He affects little knowledge of science. Nevertheless he betrays an extensive and thoughtful acquaintance with the writings of Spencer, Huxley, Tyndall, Mill, and Mansel. He has the courage to attack with unsparing logic, in colloquial English, the most modern speculations and conclusions of science. Yet some of his positions are novel and startling. Whether the chemist will abandon his long-established theory of latent heat for that of the cessation of its existence; or whether, for a similar reason, the Positivist will cease to talk of the indestructibility of force; or whether Mr. Spencer will be convinced that his "absolute force" is so little absolute that it consists of at least six powers, is a question. They may reconstruct their hypotheses, or treat the author with dignified silence, or return his blows and demolish their opponent. To us it seems that some of these distinctions, even if they represent more accurate conceptions of the agents of "changal causation," practically leave the main problem of "creational causation" where it was before. If the creative energy reside in nature itself, it is of small importance whether there be one force or six powers. The question is whether behind the universe of things there is not a higher power, a *causa causans*, at work, to whose will all nature is subservient. The author's reasoning, that if matter and force are eternal, a creator is excluded, but that if anything had a beginning, we are compelled to believe in a Creator, puts the problem fairly. And we are at one with him in the conclusion that there must have been a Creator, since we have "stumbled" upon something which has had a beginning, and could not have created itself, viz., life. For there was no life antecedent to the period of the incandescence of the globe, since organisms cannot be evolved by any known synthesis from inorganic matter, nor can they endure even a moderate temperature. The further consideration that inorganic matter appears to exist chiefly for living beings, and the substantial identity of substance between the earth and the sun, between the sun and the other fixed stars, raises the strongest presumption that the "primitive nebulosity," out of which, we are told, by the interaction of atoms, all things have been developed, has the same origin in a Creator. But, even if "matter is a spiritual substance, composed of groups of powers," and "the seventy elements are what they are in consequence of various quantities, proportions, and arrangements of powers," they could not have arranged themselves into various structures, each contributing to unify everything in nature to one plan, with microscopical adaptability to specific ends, in infinite beauty and beneficence of purpose. This were to endow matter generally, or some of its constituent atoms, with intelligence. That this should be the effect of properties inherent is no more conceivable than it is conceivable that the

various materials which make up a chronometer should evolve themselves from their dark mineral home, burnish, shape, and fit themselves into their place, with a unity of purpose to tell the time with an accuracy as undeviating as the sun. We argue a maker, not only from the fact that there was a time when watches were not, but also from the perfection of the result of the process by which means are adapted to an end.

We admire the enthusiasm, the pertinacity, the point, and potency of the author's reasoning along the whole line of thought to its conclusion—the belief in a *creational* causation. But we think that he has underrated the argument from design; and, given a creational causation, we differ from him in believing that changal causation equally requires a Creator, since it is a continuing process, and urges belief in one "who *upholdeth* all things." He has, however, promised a sequel in which he will deal with man's moral relations to the Creator, and we trust that he will be able to prove to us with the impartiality, the power, the logical analysis of which he is capable, that *conscious*, *intelligent*, and *moral* existences also, find no adequate explanation in an evolution of the metaphysical from the physical, and furnish the strongest ground for reversing the Darwinian guesses, suggesting that they proceed not from a lower but from a "higher power;" and we trust that he will be assisted in inquiry by consulting Revelation. Mr. Bell's attempt to form a conception of God as against Mr. Mansel's theory of the Absolute, is very beautifully expressed; we wish we could have quoted the whole. "Space enables us to understand how it is that in Him we can live and move and have our being; how the finite can co-exist with the infinite. and the infinite remain infinite; how additions can be made to the sum of things, and the infinite be infinite as before." Speaking of gravity as "a power which seems to pervade all things, to be present everywhere, to subsist at the same time in all matter and in all space, to subsist in all things, the same as if no other force or power existed, to inhabit all bodies, molecules, particles, atoms, at the same time that all other powers inhabit them . . . which co-exists in the same place and at the same time with all bodies and their forces, and with space as well," he says, "the presence or absence of things makes no difference in its (space's) infinity. It is no wonder that space is so wonderful—that we cannot think of it as non-existent, as having beginning, or end, or middle, or side, or limit; that it should be at once perceivable and unperceivable, unknowable and knowable, as different from all things as containing all things; that without it we cannot even suppose any other existence; as that which . . . produces, creates (!) all things. Have we not seen a new Power—the power of life emerge from it—for space—I tremble while I write the words—is God." To this last we strongly demur, as being contrary to the author's view of the personality of God. He tones this statement down further on, saying "space is the mode in which the Infinite God manifests Himself to us." It is doubtless one of the many modes, but *the* mode of His manifestation to us is the Incarnation of His Son. As an illustration of the Scriptural doctrine of His Omnipresence, "Do not I fill heaven and earth?" infinite space is beautifully set before us, but it is a far different thing to say that space *is* God. The truth is, that He pervades all things like space, and it may be through space.

The author's most scathing criticisms, however, are reserved for Mr. Herbert Spencer. We consider him fairly pulverized by Mr. Bell. Mr. Spencer himself is puzzled with what he considers "the contradictions, impossibilities, and irrationalities of his ultimate scientific ideas." Perhaps he will be thankful to be assured, by the reasoning of Mr. Bell, that these contradictions exist only in the imagination of Mr. Herbert Spencer. In our opinion that gentleman thinks and writes too much, and takes far too wide a range for a single mind. Attempting to unlock mysteries which only a revelation can explain, he is bewildered that phenomena exhibit gaps which fit not

in with his theories. Doggedly refusing to lift his eyes above the blind forces of the universe to the contemplation of a personal Creator, a finite man grasping at the infinite, he professes to enlighten this generation, and he himself is stultified. He abandons the research at the very goal of all inquiry, and confesses to a power unknowable. He attacks the fabric of creation ; he attempts to reconstruct nature on the basis of its own inherent energies. Having completed, as he thinks, the work of destruction, he discovers that he cannot even lay the foundation. Professing "to be wise above what is written," he has to confess to an ignorance as profound as it is pretentious. He is content to contemplate the ruin he has attempted—to fold his arms, and utter the sigh "unknowable."

We are glad to find that a thinker has been found who, though not altogether free from some of the errors of modern speculation, cannot be accused of theological bias, and has had faith enough in the accuracy of his own independent investigations to assail fearlessly the very ultimate ideas which are the heart and soul of the scientific scepticism of to-day.

THE LITERARY WORLD

July 27th, 1888.

WHATEVER may be the ultimate verdict pronounced on the conclusions arrived at in Mr. Bell's book, few, we think, will be disposed to question the ability of its author. Without professing to be more than an ignorant person, he has produced a volume which, in the scope of its research, deserves to be called learned, and, in the clearness of its style and the subtlety of its arguments, to be spoken of as illuminating. To him, as to endless generations before, the great problems of Nature and Human Life have presented themselves as far-reaching mysteries into which the keenest of human intellects can peer but a little distance, yet from the fascination of which the mind of man is unable wholly to withdraw its gaze. He has, therefore, thought on these things ; and, judging from the great amount of clever reasoning, and of curious speculation to be found in these pages, we should say he must have thought on them for a very long time. In so doing, he has taken a line which it appears to us he is fairly entitled to take. He does not profess himself to be master of any one of the sciences with which he has to deal, though we think his modesty leads him to do less than justice to his own philosophic attainments, and to his possession of a mind intensely metaphysical. But he says, in effect, that he will take knowledge, facts, arguments, and inferences, as they are presented by the most eminent masters in the respective branches of science, will weigh their words, and then draw his own conclusions. This is a method well understood. On it our judicial system is based, and, according to it, a vast number of practical affairs of very great moment are decided. Neither judges nor juries profess to be versed in all the matters on which they, nevertheless, have to deliver judgment. Yet they rightly arrive at, and express, opinions on evidence presented. So it is properly open to theologians to accept evidence of facts from competent observers, and then to claim to decide, with as full an authority as the observers themselves, to what ultimate conclusions the evidence points. Mr. Bell has done no more than this ; but this he certainly has done with an acumen which many a distinguished occupant of the bench might envy.

THE PROBLEMS STATED.

"Before we go further, it may be as well to confess that I am only an ignorant person. I do not pretend to be possessed of any deep knowledge

of theology, philosophy, or science. I pretend to no more than, I hope, an average amount of common sense. Like others, I cannot help pondering a little on the problems of Nature and of Human Life; and I am much perplexed by the contradictory statements made by those who profess to explain things, and to tell me what I ought to believe, and how I ought to act; how I come to 'be' and why I 'be;' what is the object, or no object of my existence; what I am; whence I come, and whither I am going. One tells me Life is the gift of an infinite, all-wise, all-knowing, all-just, all-benevolent 'Creator.' Another, that I am the product and victim of an 'unconscious' Creator who cannot help creating me, for to 'create' is a necessity of His nature; that Life, from its very nature, is but another name for suffering, and that what little happiness falls to man's lot is founded on illusions—which soon vanish, leaving only irremediable misery; that Life is a curse instead of a blessing; which would seem to lead to the conclusion that the 'unconscious Creator' must be an infinite idiot and fool. Again, on the other hand, I am informed that Life is a glorious gift of inestimable value, and calling for eternal gratitude on the part of man, seeing that it opens to him a path leading to inconceivable and everlasting happiness—though, curiously, not one in a million will ever attain to that happiness, but only to that which is its exact opposite—everlasting misery. Another tells me that science and philosophy show, incontrovertibly, that the idea of 'Creation' is a preposterous figment, and that, on the contrary, all things have eternally existed; for we cannot point to any time when anything that exists now did not exist; or if there were such, it owed its existence to some new combination of things already existing, and, consequently, there is no need for the supposition of a Creator who 'called them into existence.'

"When I inquire about the nature of Good and of Evil, of Right and Wrong—whether man be responsible for his actions or not; whether this life is all, or whether there be any continuance of life in some future state; one tells me that we are possessed of Free-will, and that consequently every one is responsible to a just and severe Judge for even the most trifling thoughts and actions; while another tells me we have no freedom at all—that we are governed by a blind necessity, in the shape of universal and invariable law—that we cannot be otherwise than we are—cannot do otherwise than we do; that our character, on which our thoughts and actions necessarily depend, is made *for* us, and not *by* us; and that the height of human wisdom is to avoid as much pain, and get out of Life as much enjoyment as possible, 'to eat and drink, for to-morrow we die,' and there an end; that we should not be so foolish as to spend our time, and strength, and money, in vainly endeavouring to ameliorate the miseries of the world, in the baseless hope of an everlasting and immeasurably great recompense at the hands of an imaginary Creator; that our fond belief in immortality is the result of the vain estimate of the human *Ego*, of its own greatness and importance—as vain as the belief of old times, that the earth was the great centre of existence, and that the sun, moon, planets, and stars revolved around it, and had no other value, except in so far as they ministered to the needs of man, who was supposed to be the 'lord of creation,' and for whose use and pleasure they were indeed 'caused to be;' that his boasted superiority over the 'beasts of the field' is a delusion, and that his only superiority over them consists in his greater capacity for suffering.

"Now what are we ordinary, ignorant people to do in face of such contradictory teaching? How are we to 'find out' what in them is false—what true? Who shall decide when 'doctors' disagree?"

Now, unfortunately for the reader of this book, Mr. Bell does not as yet answer all the questions he has asked. He only gives us an instalment, the completion of which will come in a later volume—'perhaps.' But then

the instalment he gives touches the centre of all theological speculation—that middle problem, in fact, without which the very name of theology is a contradiction—the existence of God. The grounds for this belief are, as they must ever be, the real battle-ground of theology. Mr. Bell does not waste time over the ordinary basis accepted by so-called Evangelicals as sufficient for this belief, though it begs the whole question by accepting the existence of God on the authority of a Book of which He Himself is postulated as the author. He reaches higher ground perhaps in Dr. Flint's postulate,—that 'Nature is but the name for an effect whose cause is God.' Dr. Flint's God, however, merely presides over the course of evolution already going on. He does not start the process, but superintends it. Dr. Flint postulates a nebula, and then explains its evolution. But there is no theory of creation in this. What is wanted to be known is whence comes the primary atom, whatever it may be, which is ultimately destined with its derivative fellow-atoms to be built up into complex forms of life. Certain physicists,—of whom Mr. Bell cites Mr. Huxley and Mr. Tyndall as examples,—can only assert that Matter and Force, as represented by the atom, had eternal existence. Of course in this case there is no more need to consider who or what the Creator was than in the case of Dr. Flint's theory; especially as Life itself, they believe—though on as purely hypothetical grounds—to have been a product of the Matter and Force in question. But this blind belief in the potency of Matter will not do for a metaphysician like Mr. Spencer, who accordingly depicts a single 'Absolute Force,' of which all phenomena are merely manifestations. This, says Mr. Bell, is Pantheism; and it is to be rejected, both on other grounds and by the individual consciousness, that cannot confuse itself with a universal Divine substance, of which it is merely a localised modification.

It may be felt that Mr. Bell himself comes perilously near to the same position when, as the final outcome of his investigations, he identifies God with space illimitable and eternal, wherein, and pervaded by which, all the separate consciousnesses that demonstrate distinct individualities dwell. But he is rescued, or rather he rescues himself, from the Pantheistic position by laying down the bold and startling doctrine that two things can exist together in the same place at the same time.

To do justice to the very ingenious argument by which he upholds this doctrine is not possible in the limited columns of a review. But he has at hand the power of gravity, with its *continuous* action *through* all other bodies, as an illustration of a something which is not resolvable into, and is, therefore, presumably different in essence from, the other primary Powers of Nature—viz., chemical affinity, elasticity, cohesion, magnetism, and polaricity—and which can and does, nevertheless, subsist in, and act through, all atoms and bodies in which such Powers are also present. Those who think that the atom or Matter is a thing of itself, with a certain corporeal grossness, on and in which the Powers act, will find themselves unable to entertain Mr. Bell's idea that two such bodies can occupy the same space. But to him the physical atom is as commonly understood non-existent. He adopts a modified form of Boscovitch's theory, and holds that the atom itself is merely a group of the above-enumerated Powers. Body or Matter, therefore, is not what we usually speak of as material, but is spiritual—is made up of these bundles of Powers, which, in their active form, are to be called Forces. From this point of view Mr. Bell's proposition of the joint occupancy of the same space by two bodies is tenable.

The importance of these considerations is derived from the fact that for the metaphysical idea of God we must have that conception of Infinity—or unlimitedness—which Space alone, of all things we know, gives to us. It would not be Infinite if that which exists in it took from it; for in that case it would be limited or made finite by what had been introduced. From the

preconsidered pervasive action of Gravity, however, the presumption is that the Infinity of Space is not infringed on by any of its contained Powers. It may answer then to the idea of God as regards Infinity. But something else goes also to that idea—viz., the conception of the Absolute, or that which is unrelated. Mr. Bell affirms that Space answers in this respect also to the idea of God; as we may suppose the absence of all bodies, but cannot suppose the absence of Space itself. Space, therefore, is "one," and unrelated. Whether, however, he who conceives of otherwise empty Space can so conceive of it as to exclude his own relationship to it, and its relationship to him, in that very act of thought, is a question with which, as far as we can discover, Mr. Bell does not deal; but which in our judgment requires very careful answering before it can be admitted that Space fulfils the idea of the Absolute. If these difficulties are surmounted, then, it seems to us, that Mr. Bell has easier work in predicating of Space that it is also the First Cause. For here the question of the Origin of Life comes in; and as this is shown to be a Power, not only different in its nature from the other Primary Powers, but one whose terrestrial origin must have post-dated theirs, and yet could not have been produced by them, it follows that into Space this new Vital Power emerged presumably as the product of that Space. In other words Space—the unlimited and the unrelated—gave rise to Life.

What is Life?

"The combination of atoms which we call a living body is of such a nature that it cannot endure under the action of even a moderate heat. The spore can endure even a greater heat than the adult. The highest heat any living creature has been known to survive—as shown in the experiments of Dr. Dallinger—is 290° Fahr. It therefore follows that there was a time in the earth-history when, in consequence of the intense heat, no life could exist. But Life exists now, and, as geology shows us, has existed during countless ages. As it cannot, so far as we know, exist in any temperature higher than 290° Fahr., it could not exist until the earth's crust had sufficiently cooled to permit that combination of elemental substances which exhibits the phenomena which we call Life to take place; and so it would seem that the 'origin' of 'Life,' since it has had a 'beginning,' has to be 'accounted' for.

"There is a very remarkable fact to be noted with regard to the present origination of Life. 'Life' invariably arises from 'antecedent' life; which gives rise to a difficulty. If, on the one hand, there was a time when it was impossible—on account of the intense heat of the earth's surface—that life should arise; and, on the other, that all our knowledge and experience of the 'coming into existence' of life, be that it invariably comes from 'antecedent' life; how could life '*begin*' at all? If we take the chemical elements which analysis shows us constitute living protoplasm, and put them together we find that Life is not produced. Of course, it may be said that it is impossible to make a perfect analysis, because the moment you begin to analyse you kill the protoplasm, so that it is not 'living' protoplasm which is 'analysed,' but protoplasm which is 'dead.'

"I do not think this objection is valid. If Life is the result of a combination of elementary substances, then the analysis can be commenced only by separating some component of the combination from the rest; you cannot expect to retain the 'result' of the combination while you *undo* that combination. But analysis does not deprive the analyst of any of the combined substances. Let him continue his analysis until he has decomposed the whole combination. Let him, then, put them together again on the same order and under the same conditions of temperature, of succession, etc., as when he separated them. Let us suppose he has proceeded with

the work of recombination till only *one* element has to be added, there will, of course, have, as yet, been no sign of Life, for one element is still lacking. But let him complete the synthesis by adding the final substance, and what ought to be the result? Why, Life of course! But Life does not result. The combination is as dead as were the individual atoms.

"So far, Life would not seem to be the result of a combination of non-living elements."

Now it may seem that Mr. Bell has posited a very cold abstraction for the more genial anthropomorphic idea of God. The sense, however, in which he declares Space to be God, is, as we understand, only as a mode of Divine Manifestation to us. Regarded in this light it is certainly interesting to find how many of what are reverently received as other revelations of God fit into the theory, which, like other theories, must be tested by its applicability to known facts or well-grounded faiths. God's eternity would seem to have impressed men's minds more than His ubiquity, as to which, indeed, localised shrines, and set seasons of devotion, have always implied an element of doubt indulged, if not confessed. This treatise should counteract such restricted notions. But it will do more than that. For though the validity of its conclusions is not a matter on which final opinion can be expressed for, perhaps, many a long day, yet theologians and preachers should find in it much that will enable them to present some very forcible answers to the scientific scepticism of the times. There are some faults in the book, apart from whatever faults of reasoning there may be. The author's vivacity, exhibited in anecdote and expression—occasionally detracts from the dignity proper to a lofty philosophical theme. There are a few printer's blunders—as in the use of 'if' instead of 'of' in line 9, page 330. Mr. Spencer is not always fairly used, as may be seen by reading the last completed paragraph on page 178, along with the third completed paragraph on page 222. No doubt more serious matters call for attention, such as the omission to consider Joule's experiments in connection with the denial of the conservation of Force. But the general scope of the book *will afford keen delight to all who relish controversy in elevated regions of thought, and will do something, we hope, towards counteracting the materialistic tendencies of our age.* Till we have seen the completion of the work in the second volume it will not, however, be possible to say what—as regards our conception of the Divine Nature—we should gain or lose by accepting Mr. Bell's positions.

THE NONCONFORMIST AND INDEPENDENT.

September 20th, 1888.

SIR LYON PLAYFAIR, speaking recently at the opening of a public library, said: "Such was the importance of freshness of mind that many of the great inventions had been made by men who had been brought up outside the subject in which their inventive powers were exercised." We could not help applying this saying to the author of this book—a man trained neither in science nor philosophy, but who has brought to the consideration of many of their dicta a fresh and candid mind, singularly unbiassed by any preconceived theories, and which refuses to bow down before any of the great names in either science or philosophy, but subjects their affirmations to the keenest examination of which he is capable. It is rather refreshing to meet with a man who will break a lance with Spencer or Huxley or Tyndall as fearlessly as if they were unknown men. In too many quarters their dictum is taken as if it were the very gospel of science,

and they are elevated to a position of authority such as the Fathers and Reformers have often held in matters theological. "Authority" is quite as strong just now in the scientific as in the ecclesiastical realm. Mr. A. J. Bell is not prevented from attacking what he believes to be erroneous by any such influence. It must not be imagined from this that he is a mere iconoclast or disputant. He is bent on reaching truth, and has shown this by giving many years to the production of the present volume.

It is manifestly impossible to give any fair idea of a book like this in the limited space at our command. All that we can do is to indicate its line of thought. Its real purpose is to show that man is not the product of Nature, but of God. The author, before writing his book, turned to works on Theism to see if they furnished a satisfactory proof of the existence of God. That by Dr. Flint, being the latest and most widely circulated, was taken as reflecting the latest thought, that "Nature is but the name for an effect whose cause is God;" but since Dr. Flint deals with *changal and not creational causation*, the argument is of no value to one who discerns that mere changal causation can be accounted for by the interaction of forces already in existence, and does not necessitate, as does *creational causation*, a real creator. From the theologian our author, therefore, turns to science and philosophy in his search for an explanation of the mystery. As Mr. Herbert Spencer has dealt with the questions of existence and the origin of things most fully, and is reckoned by a considerable number as a kind of oracle, our author turns to his pages for light, but finds only darkness worse confounded. A very considerable portion of the book is occupied with an examination—we may say, a very searching examination—of Mr. Spencer's "First Principles," especially in relation to the ultimate scientific ideas of "space and time," and the indestructibility of force. Concerning the first of these, our author seeks to prove that whilst *space* is an actual entity, *time* is only a mode of thought; and concerning the second, that whilst *powers* are indestructible, *forces* are the only destructible things. To Mr. Spencer's position, that impressions and ideas are alike manifestations of an unknowable and absolute force, Mr. Bell opposes the doctrine of the personal individuality of man. "Every man," he remarks, "is unavoidably and intuitively conscious of himself as being absolutely different from all things whatsoever, and that his individuality cannot be even 'supposed' to be merged in that of any other individuality." Mr. Bell makes splendid use of the inability of the scientists to find what they eagerly desire to find, and still entertain the hope that they *will* find, an example of the spontaneous generation of life. Mr. Huxley admits this in the frankest way, but still clings to the hope that some day such an example will be found. Mr. Bell's treatment of the teaching of Tyndall and Huxley respecting Protoplasm is exceedingly acute, and in their utter inability to produce living forms out of Protoplasm he finds the proof of what *he* is in search of—a real beginning of *creational* causation. He says, "Life is therefore not 'natural,' does not come from inorganic nature—it is *super*-natural. But it is not 'contrary' to Nature—to inorganic Nature. Inorganic Nature is the sum of powers constituting the total of the groups of powers which we call atoms. It is an addition to the powers of Nature. It is *plus* Nature, *above* Nature, not *contrary* to it." This is one of the chief points in Mr. Bell's argument.

To Mr. Spencer's declaration of the impossibility of conceiving of an Infinite Creator, and at the same time of finite existences—a difficulty common to the Agnostic philosopher Spencer, and the Trinitarian divine Dr. Mansel—Mr. Bell opposes a doctrine of space which includes the startling idea *that two things can be present in the same place at the same time*—an idea supported by very striking and subtle arguments and illustrations, and on which his solution of the mystery of existence largely

depends. For this we must refer our readers to his pages. In his idea of *space* is to be found his doctrine of God, which at first looks very like Pantheism (or as he would call it, Panism), but which is far nearer to the great conception of the Apostle, "In Him we live, and move, and have our being." This is one of the most striking ideas of the book, and taken in conjunction with the idea that whilst matter is eternal, life is *created* — a position abundantly supported by the last results of science—may be said to go a very long way, even if it does not go all the way, to answer the question which forms the title of the book, "Whence comes Man? from Nature or from God?" It should be said that all the proved conclusions of the Evolutionists are accepted by Mr. Bell, and fit admirably into his theory, since they only touch man as a physical being, and leave ample space for the development of life, "at a comparatively late period of geological time, to powers already existing." Mr. Bell claims, and rightly, that his theory of space, as furnishing the solution of the difficulty of how an Infinite Being can co-exist with finite creatures who shall preserve their personality, does not, as at first sight it would seem to do, make God a mere abstraction or put Him far off, but renders it possible for us to believe that "in Him we scientifically, physically, intellectually, metaphysically, morally live, move, and have our being." In the course of his argument Mr. Bell puts forth many striking and even startling theories relative to gravitation, the sun, and other matters. Doubtless some of these will give way under critical examination. It would be strange if, travelling over the whole range of science and philosophy, he did not here and there stumble. But though parts of his argument may be overthrown, there will yet, we believe, remain a valuable residuum of truth which will help to furnish a scientific basis for the idea of God, and man as proceeding from Him. For this, if it comes to pass, we shall be thankful. At all events, he has shown that Mr. Spencer is not the oracle which some believe him to be. Some of that philosopher's positions, in our judgment, he has completely shattered. We trust that it will not be long before the second volume, in which the great questions concerning man and God, and their relationship to each other, which he half promises, may see the light. Meantime, we thank him for an original, powerful, and searching consideration of the great question dealt with in the present volume.

INQUIRER.

August 11th, 1888.

THE *book before us is an extraordinary one*, alike in the number of its citations from other works, which causes its pages to bristle thick with quotation marks and in the full use of emphasis for its special statements, found in an unusual use of italic type. The use of uncommon words is frequent, and such terms as "memorition," "magnicity," "changal," "panism," and others strike on the eye curiously. The general outline of the book may be shortly stated. First comes a statement of the problem to be dealt with, and then the futility of the positions assumed by some of the leading and most active thinkers of our time is shown. They have nineteen out of the twenty chapters constituting the book devoted to them. The first dealt with is Dr. Flint, and his weak points are shown in the clearest light, and it is made manifest that just where it ought to have been strongest and most evident it is weakest and obscurest. Still it is acknowledged that he has great merit, and though he does not account for creation, or prove that "the universe is an effect of which God is the cause," he throws much light on processes. Our author next falls, with a considerable degree of gusto, upon Herbert Spencer, whom

he finds guilty of over-statement and of gaining his conclusions by contradictory statements. (For illustration see pp. 147-8.) As for his ultimate power being "unknowable," Mr Bell declares it to be among the earliest of recognition and one of the best known of all existences. Almost in every instance where Herbert Spencer says "No," Arthur John Bell says "Yes," and gives very good reasons for so doing. We are next treated to a criticism of Professor Huxley in reference to Protoplasm and the origin of life. In the course of these criticisms he turns aside to Darwin, and propounds questions which had that most candid of all philosophers been living, we have no doubt he would have weighed with the most serious and even prolonged reflection. Our author next greets Tyndall as he has expressed himself in his various productions, and his statement that he finds in the matter which men are apt to treat with contumacy, the promise and potency of all terrestial life, is subjected to a searching criticism, in the course of which what to us are original suggestions are thrown out with great force. Professors Clifford and Stokes are also incidentally but effectually, as it seems to us, dealt with. Thus we go on towards the end of the book, and it begins to seem as if the conclusion was to be that the Cosmos, the orderly universe, originated in eternally existing atoms, with their powers of cohesion, repulsion, "magnicity," etc.; but with the twentieth chapter a fact turns up that alters the whole aspect of the scene we have been looking at so long. The author is brought to a stop in his victorious career of analysis in the presence of life which refuses to be analysed. What is Life? asks our author. In relation to everything else he has been enabled to give some answer, but here he is stricken dumb. The verdict of science is that "Life invariably arises from antecedent life, which gives rise to a difficulty. If on the one hand there was a time when it was impossible on account of the intense heat of the earth's surface—that life should arise, and on the other that all our knowledge and experience of the coming into existence of life be that it invariably comes from antecedent life, how could life 'begin' at all. And if we take the chemical elements which analysis shows us constitute living protoplasm, and put them together, we find that life is not produced." The conclusion is that "Life is therefore not 'natural'—does not come from organic nature, it is supernatural" (p. 312). Science can imitate, or simulate anything in nature, but to produce life is beyond its power. It began to be, and therefore needed a Creator to originate it. The fulness, the power of the argument we have not space to give, but any reader with a mind open to conviction cannot but be convinced, we think, that the author has worked out an argument that can hardly be refuted. He goes on triumphantly to the end contending that man originated not with nature but with God. But he has much more to say in reference to the character of God, and the reason for man's creation, and the last words of the book are "To be continued—perhaps!"

In the course of the argument many curious questions are propounded, and discussed in a way which proves Mr. Bell to have a fertile mind, a strong, clear head, and a keen relish for metaphysics. *We advise the reader to be prepared to do a great deal of hard thinking as he goes through it. He will receive much help, however, in the clearness of statement, and the tension is relieved now and then by a humorous story* which is told in order to illustrate some abstruse point; and though it is sometimes an oft-told one is *always to the point*, and really does answer the purpose for which it is given. For our own part *we shall look with much eager interest for the second volume, which if it equals the first will establish the author's reputation as one of the thinkers of our time.*

W. M.

NORTH BRITISH DAILY MAIL.

July 2nd, 1888.

THE typical Scotsman, who is supposed to be devoted to metaphysical speculation and never weary of theology, will find sufficient matter to wrestle with for many months in the volume, "Whence comes Man? from Nature or from God?" by Arthur John Bell (London: William Isbister). The first four chapters are devoted to the nature and origin of things, the problem of existence, and ultimate scientific ideas, and in the succeeding chapters we find some trenchant criticism of the views of Mr. Herbert Spencer on space, time, and matter. Mr. Bell does not pretend to be possessed of any deep knowledge of theology, philosophy, or science. But he claims to have an average amount of common sense; and being much perplexed by the contradictory statements of those who profess to explain things, and to tell him what he ought to believe, and how he ought to act, he has done some thinking for himself, and the result he now publishes in the belief that it may be helpful to others. That he is an earnest and reverent seeker after truth is made manifest on every page, and though his book cannot be said to have any literary attraction, or to be indeed aught else than a particularly stiff bit of reading, the simple integrity of its writer's purpose, and his strenuous determination to get at the truth, make the work one which will reward a careful perusal.

CHRISTIAN WORLD.

July 19th, 1888.

MR. Arthur Bell's work, entitled "Whence comes Man? from Nature or from God?" is one which well deserves the attention of ministers and all leaders of public thought. It is *a volume of theological and philosophical speculations of a strikingly original character, put in luminous and vigorous language; and those who desire to be furnished with extremely able and ingenious arguments wherewith to combat the agnosticism of physicists and metaphysicists will find here what they seek.* In following Mr. Bell through his controversies a knowledge of the positions severally assumed by the great names in modern science will be obtained, while the reader can scarcely fail to be struck with surprise at the gaps which some of them have left in their armour, and at Mr. Bell's keenness in detecting them. The novelty and boldness of his arguments for the existence of a Creator will require much consideration before they can be finally accepted. But the perusal of the volume will be delightful to all who feel drawn to such high themes, and, by reason of the extent to which it taxes thought, cannot fail to prove intellectually stimulating. The publishers are Messrs. Isbister.

THE OXFORD UNIVERSITY HERALD.

February 14th, 1889.

WE have not the space at command for any adequate review of this book which challenges most of the modern scientific theories. But we may say that it is a book which will pay perusal. The author does not in reality do himself justice in claiming but a limited acquaintance with speculative

science. But he has studied Darwin and Huxley, John Stuart Mill, and Herbert Spencer, and Tyndall, etc., etc., which seems quite a sufficient equipment for writing; and there are very few of the problems which they profess to solve on which he does not touch, and touch satisfactorily. The title which he gives to his book is perhaps not very happily chosen—but the answer to the question is plain and unmistakable—"Man," he says, "it seems to me, is the highest development of the 'Power' called 'Life' —a Power added (not evolved spontaneously), at a comparatively late period of geological time, to Powers already existing."

"To the question, then, 'Whence comes man? does he come from nature or from God?' we must, I think, reply—

"That not only man but nature also owe their existence to the Infinite Eternal Being—God, Who created all things.'"

Mr. Bell adds to the end of his volume, "To be continued, *perhaps*." We hope that it will be.

METHODIST TIMES.

November 8th, 1888.

THIS interesting volume begins in the way of all others most seductive to the general reader, one of whose standing grievances the author makes his own. What or whom are we to believe in these days of contradictory teaching? "Who shall decide where doctors disagree?" The most popular plan appears to be to pin one's faith to the exponent of some one principle —let us say, Professor Tyndall or Dr. Fairbairn, Mr. Frederic Harrison or Cardinal Newman—and then, having made up his mind, stoutly refuse to hear any other for fear of having to unmake it again. Mr. Bell's plan is certainly more soothing to our dignity as rational creatures. He proposes to examine the various solutions of the mystery of the universe offered by the principal modern thinkers. "We can," he says, "submit them to the judgment of such common sense as we may possess, to see, so far as we can, whether they corroborate and harmonise with or contradict one another." It appears to the author that the answers to the question he propounds on his title-page are of two kinds—theistic and atheistic. Either the universe was self-created, or a God exists. He passes in review first the theistic argument of Dr. Flint, then the metaphysical philosophy of Herbert Spencer, and the physiological teaching of Huxley and Tyndall, without finding a solution in which his intellect can rest. The doctrine of a Creator, to which he finally gives in his assent, appears to rest for him on the genesis of life, inexplicable hitherto on any other theory. The work, as a whole, is very suggestive, and will be read with interest by those outside the circle of scientific students.

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